



EUROPEAN CENTRAL BANK

EUROSYSTEM

Financial Stability Review

May 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 the ECB's new macroprudential and microprudential tasks. With the establishment of the Single Supervisory Mechanism, the ECB was entrusted with the macroprudential tasks and tools provided for under EU law. 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 and insurers – 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 five boxes and three special features aimed at deepening the ECB's financial stability analysis and basis for macroprudential policymaking. A first special feature presents the general case for setting macroprudential margins and haircuts on derivatives and securities financing transactions. A second examines systemic implications of the bail-in tool under the Bank Recovery and Resolution Directive. A third reviews recent trends in business model characteristics and discusses their relationship with bank stability and performance.

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

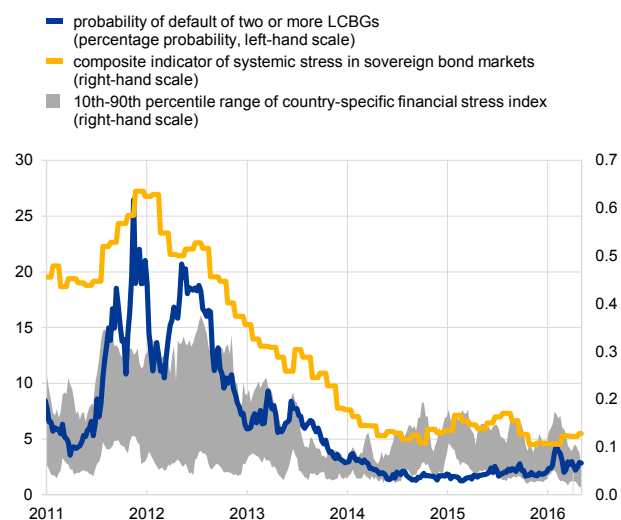
Euro area systemic stress has remained contained despite a challenging external and financial environment. Rising vulnerabilities stemming from emerging market economies (EMEs), coupled with occasional bouts of financial market turbulence, have tested the resilience of the euro area financial system over the past six months. Overall, the euro area financial system has been able to absorb the tensions, with standard indicators of bank, sovereign and financial stress all standing at low levels in mid-May 2016 (see [Chart 1](#)).

Chart 1

Bank, sovereign and financial stress has remained contained in the euro area

Financial stress index, composite indicator of sovereign systemic stress and the probability of default of two or more banking groups

(Jan. 2011 – May 2016)



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. The financial stress index measures stress in financial markets at the country level based on three market segments (equity, bond and foreign exchange) and the cross-correlation among them. For details, see Duprey, T., Klaus, B. and Peltonen, T., "Dating systemic financial stress episodes in the EU countries", *Working Paper Series*, No 1873, ECB, December 2015.

Vulnerabilities arising from slowing EME growth prospects have continued to rise since the beginning of the year. From a euro area financial stability perspective, vulnerabilities stemming from

China are a particularly important source of risk given the country's growing role in global trade and financial markets. Vulnerabilities are, however, also on the rise in several other EMEs, notably those with close ties with China. Contributing further to EME vulnerabilities is the high private sector leverage observed in several of these countries. Private sector indebtedness is at historically high levels in several EMEs and a large share of this debt is denominated in foreign currencies. All in all, a sharper than expected fall in Chinese growth could well lead to a synchronised downturn across other EMEs, particularly commodity-exporting economies. Under such a scenario, the financial systems of advanced economies may be challenged by a reduction in consumer and business confidence, and renewed financial market volatility potentially intensified by sudden stops in or reversals of cross-border capital flows.

Oil prices have been volatile, but remain at low levels, increasingly reflecting weakening demand and higher credit risk. In general, low oil prices would

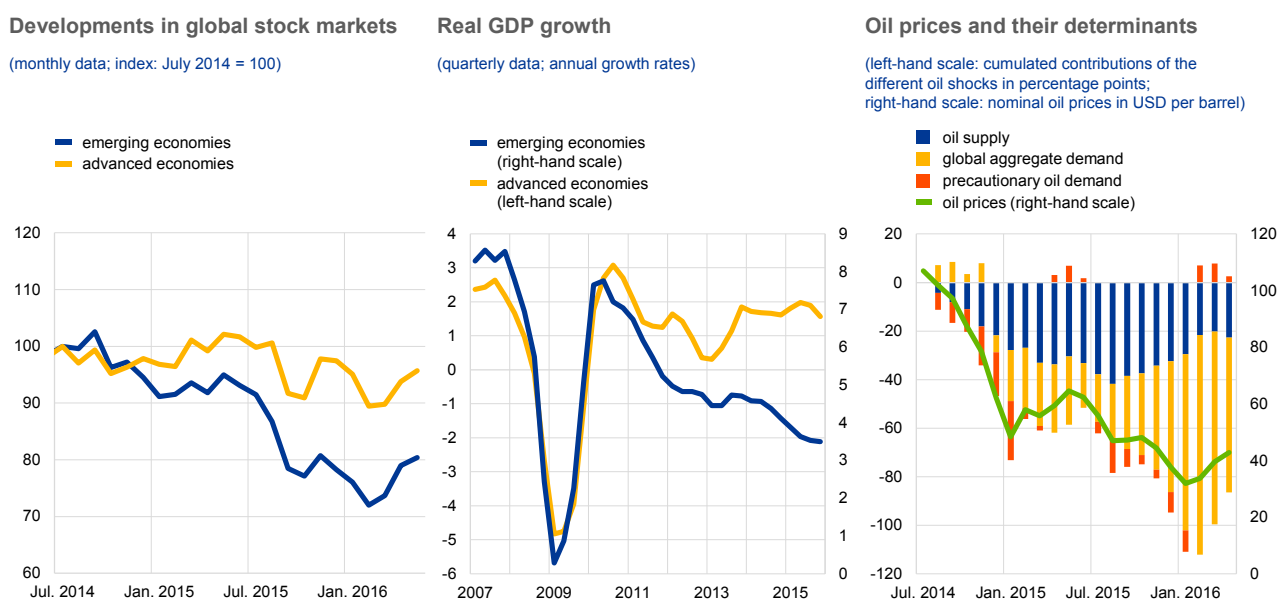
be beneficial for importing economies such as the euro area as they reduce energy costs. However, exposures of the global financial system to the energy sector have been growing over the past decade and ECB staff calculations point to an increasing role of demand factors in explaining oil price developments. This gradual shift may bode less well for future economic activity than if supply factors had continued to play a large role in declining oil prices. The current low oil prices are below the marginal cost for several oil producers and also below fiscal breakeven prices for a number of oil-exporting countries. Thus, a prolonged period of low oil prices raises questions about the medium-term viability of oil firms'

business structure and may further spur credit risk concerns and higher premia demanded on riskier global assets.

These developments come amid signs of rising financial market spillovers from EMEs to advanced economies. Prices of risky assets, such as high-yield corporate bonds and equities in EMEs, fell sharply at the turn of the year and there was a significant spillover of the turmoil to advanced economy financial markets and banking sectors. This pattern repeated a tendency of the past few years whereby euro area and other advanced economies' asset prices have become increasingly sensitive to EME-related developments. The sharp fall in equity prices in EMEs in recent quarters appears closely related to growing macro-financial vulnerabilities, including the higher credit risk related to low and volatile oil prices (see **Chart 2**).

Chart 2

Lower global stock prices reflect the slowdown in EME growth prospects and higher credit concerns stemming from low oil prices



Sources: National accounts, Thomson Reuters Datastream and ECB calculations.
 Notes: Latest observations: left chart: May 2016; middle chart: Q4 2015; right chart: April 2016. 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.





Along with these challenging global conditions, euro area banks continue to be confronted with an outlook of low profitability amid the weak economic recovery and, in certain jurisdictions, high stocks of non-performing assets.

Banks' return on equity has remained subdued in recent quarters and continues to hover below their cost of equity. The low interest rate environment, a tepid economic recovery and the more challenging external and market environment have all had a dampening impact on banks' profitability prospects. In addition, a large stock of non-performing loans in a number of countries is constraining banks' lending capacity and profitability. Offsetting this, the collective weight of ECB monetary policy measures should support funding conditions for banks further, while also strengthening their profitability via higher loan demand. That said, these measures

alone are not sufficient to ensure a profitable and healthy banking sector over the medium term. Some banks may need to further adapt their business models to ensure long-term sustainability – via consolidation, cost-cutting or other efficiency measures.

Risks to financial stability stem not only from the banking sector, but also from the broader financial system including a rapidly growing investment fund sector. In recent quarters investment fund growth in the euro area has slowed owing to elevated price volatility and a partial reversal of fund flows, mainly due to emerging market stress. Still, the expansion of this sector over the last years has been remarkable, with a doubling in size since 2008. While the sector’s increasing role in credit intermediation and capital markets provides useful diversification benefits for the real economy, fragilities might also be associated with the exceptional growth given that risk-taking and interconnectedness with the rest of the financial system have been steadily increasing over time.

Table 1
Key risks to euro area financial stability

	Current level (colour) and recent change (arrow)*
Further increase of risk premia and financial turmoil, triggered by emerging market stress and persistently low commodity prices	
Weak profitability prospects for banks and insurers, with banks' intermediation additionally constrained by unresolved problems in reducing non-performing loans	
Rising debt sustainability concerns in sovereign and non-financial private sectors amid heightened political uncertainty and low nominal growth	
Prospective stress in the investment fund sector amplified by 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.

Risks also extend to the real economy, where indebtedness across sovereign and non-financial private sectors remains elevated. Delayed or insufficient fiscal and structural reforms in the context of a prolonged period of low nominal growth prospects would challenge sovereign debt sustainability. Furthermore, rising political risks amid increasing support for political forces which are seen to be less reform-oriented could translate into higher risk premia and lead to debt sustainability concerns for the sovereign sector, potentially spilling over into the non-financial private sector.

In this environment, there are four key sources of risk for euro area financial stability over the next two years. Compared with the November 2015 FSR,

most risks have increased (see **Table 1**). At the same time, all risks are clearly intertwined and would, if they were to materialise, have the potential to be mutually reinforcing. Indeed, all risks could be aggravated by a materialisation of downside risks to economic growth.

Risk 1: Further increase of risk premia and financial turmoil, triggered by emerging market stress and persistently low commodity prices

High volatility in global financial markets has prevailed over the past six months amid a rise in vulnerabilities of EMEs. An abrupt reversal of global risk premia has been signalled as a key risk for euro area financial stability for some years now. This risk partly materialised around the turn of the year when global financial market sentiment suddenly deteriorated. Higher global risk aversion was

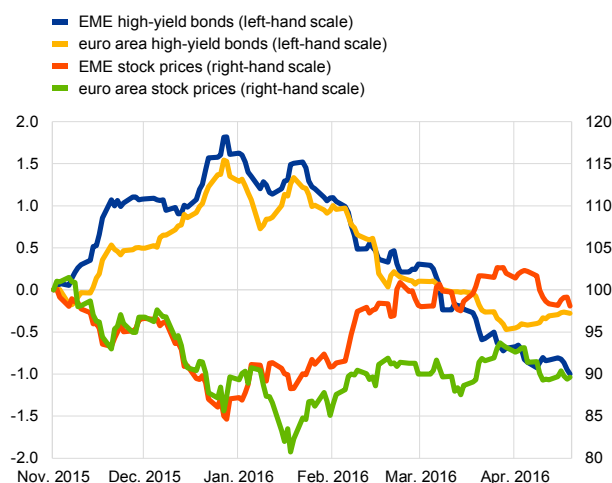
triggered by renewed volatility in Chinese stock prices and mounting concerns about EMEs more generally. Prices in some of the riskier asset segments, such as equity markets and lower-rated corporate bonds, fell sharply, also in the euro area (see [Chart 3](#)). ECB measures announced in March eased some of the tensions and the riskier asset segments recovered some of the earlier losses. Some market segments, crucial for the functioning of the financial system, were, however, less affected by the turmoil. In particular, euro area money and sovereign bond markets have remained broadly stable since the November 2015 FSR.

Chart 3

Prices of riskier assets in EMEs and in the euro area were significantly affected by the turmoil in early 2016

Developments in stock prices and high-yield corporate bonds in the euro area and EMEs

(25 Nov. 2015 – 13 May 2016; daily data; changes in yields; percentages per annum; stock prices indexed to 100 at 25 Nov. 2015)



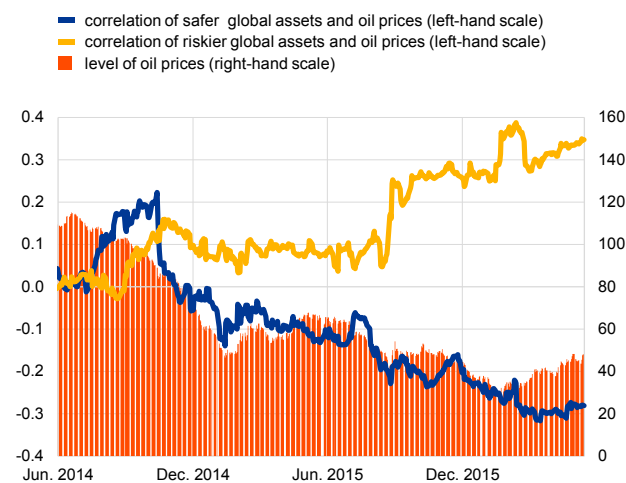
Sources: Bloomberg, Thomson Reuters Datastream and ECB calculations.
Notes: Datastream's total stock market indices are used. Euro area index in EUR and emerging market index in USD.

Chart 4

Higher correlations between riskier assets and oil prices indicate lower global risk appetite

Median bilateral correlations between riskier/safer global assets and oil prices

(1 June 2014 – 13 May 2016; daily data; left-hand scale: 180-day moving correlations for riskier and safer assets vis-à-vis oil prices; right-hand scale: Brent oil prices in USD)



Sources: Bloomberg and ECB calculations.
Notes: Moving correlations are calculated for daily asset class returns over 180-day windows. Riskier assets are defined as government bonds issued by euro area countries most affected by the financial crisis, high-yield corporate bonds and equity indices for the euro area, the UK, the US and Japan. Safer assets are defined as investment-grade and government bond market indices for other euro area countries, the UK, the US and Japan.

Oil price developments have become conflated with lower global growth expectations, while also affecting global asset price movements. Oil prices have been volatile and fallen sharply since the peak observed in mid-2014 when Brent crude hovered close to USD 115 per barrel. In mid-May 2016 Brent crude stood at USD 47 per barrel. The lower oil prices have contributed to higher credit risk and have signalled lower growth prospects, particularly for oil-exporting EMEs. Global financial markets have been influenced by oil price developments as the latter have acted as a bellwether of global economic activity. This has implied a tighter link between risk premia on certain assets and oil prices. As oil prices in 2015 dropped well below even the most bearish expectations, the correlations between oil prices and riskier global asset prices have increased (see [Chart 4](#)). Oil price developments have also influenced market developments in advanced economies. In particular, market-based indicators of inflation expectations have been highly correlated with oil price movements since the peak in oil prices in mid-2014. This pattern reflects some

concerns among investors that oil price movements not only increasingly reflect weak demand conditions, but also that inflation expectations may have become more adaptive and closely tied to persistently low inflation outcomes. Clearly, any prospect of a protracted period of deflation would be detrimental to financial stability.

The near-term risk of higher global interest rates, notably in the United States, has receded as the global growth outlook has worsened. While the Federal Reserve tightened monetary policy at the end of last year, the expected pace of policy tightening has been revised down since that time, partly on account of a more challenging external environment. This has resulted in a narrowing of the gap between the predictions for near-term policy rates by financial markets and those by the Federal Open Market Committee. More aligned interest rate expectations reduce the risk of global asset price volatility stemming from monetary policy actions in the United States.

Within the euro area, risk premia still appear contained, with valuations of financial and real estate assets not deviating materially from fundamentals. In theory, an accommodative area-wide monetary policy may have unintended consequences for certain countries or sectors in the form of excessive risk-taking, resulting in a build-up of risks in asset and real estate markets. However, looking across the spectrum of euro area assets, using a wide range of methods, there are few signs that asset prices have generally become stretched. In sovereign bond markets, yields remain low, but this is consistent with the persistently subdued nominal growth environment. In corporate bond markets, yields are broadly in line with available indicators of credit and liquidity risk. Euro area equity prices, overall, remain fairly valued compared with their earnings cycle. On the real estate side, residential property valuations are broadly in line with those suggested by fundamentals for the euro area as a whole. The situation is, however, heterogeneous across the euro area as prices continue to recover. Valuations remain low for countries which have experienced excesses in the past, whereas somewhat stretched valuations are observed in some countries which were less affected by the financial crisis. Valuations of prime commercial property appear to be high amid strong price increases in recent quarters. Taking a wider view, risks of dangerous asset price booms and busts materialising in the euro area are limited, not least as asset price developments have not been accompanied by elevated credit growth.

Macroprudential policies are best placed to tackle challenges, including those at the country or sector-specific level. 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.

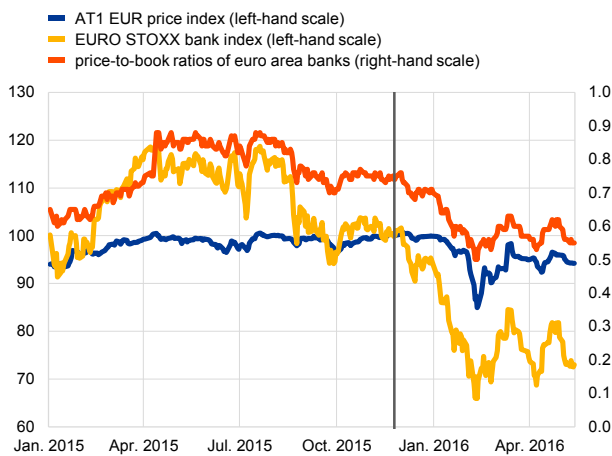
Risk 2: Weak profitability prospects for banks and insurers, with banks' intermediation additionally constrained by unresolved problems in reducing non-performing loans

Chart 5

Strong volatility in banks' stock prices and AT1 instruments

EURO STOXX bank index, iBoxx EUR Contingent Convertible AT1 Index and price-to-book ratios for euro area banks

(1 Jan. 2015 – 13 May 2016; daily data; stock prices and iBoxx indices normalised to 100 on 25 Nov. 2015; vertical line indicates the publication of the previous FSR on 25 Nov. 2015)



Sources: Bloomberg, Thomson Reuters Datastream and ECB calculations.
Note: AT1 stands for additional Tier 1.

A sharp worsening of market sentiment in relation to euro area banks around the turn of the year tested the banking sector, but had limited systemic implications. Investors became increasingly

concerned about banks' ability to generate sustainable profits in a low interest rate environment. As a result of the sector-specific concerns (coupled with the above-mentioned global factors), euro area banks' stock prices lost around one-third of their market value between the publication of the November 2015 FSR and the low point reached in mid-February this year. The turmoil also spilled over to some of the riskier credit segments, particularly the market for contingent convertible capital instruments (see [Chart 5](#)). Part of the fall in banks' stock prices appears to reflect an overshooting as bank valuations fell to levels below what could be justified by fundamentals. Bank shares and valuations have recovered some of the losses since mid-February, also helped by the ECB policy actions announced in March. With regard to the ECB measures, markets perceived that the dampening impact of more negative deposit facility rates on banks'

net interest margins would be compensated for by improved funding conditions stemming from the second series of targeted longer-term refinancing operations (TLTRO II). Overall, the systemic implications of the turmoil in banks' stock prices were limited. This is partly due to the fact that euro area financial institutions have, over the past few years, significantly strengthened their balance sheets and built up their resilience to adverse shocks.

In attempting to restore sustainable profitability, banks are faced with a number of challenges, both of a cyclical and a structural nature. Euro area bank profitability remains at low levels and banks' return on equity continues to hover below their cost of equity, while the return on assets remains well below its pre-crisis levels. The moderate pick-up in profitability since 2012 is related to positive contributions from net interest income, non-interest income and impairments (see [Chart 6](#)). On the cost side, the deleveraging of euro area banks in recent years has not contributed to any significant improvements in their efficiency, as suggested by stable cost-to-income ratios. In 2015 a number of banks experienced a deterioration in cost-efficiency indicators. The reasons for this include one-off contributions to the national resolution fund (in the case of Italian banks) or higher restructuring costs as part of the implementation of new business strategies in the case of some banks. Looking ahead, profitability prospects look weak. Analysts have continued to revise down their expectations for banks' medium-term profitability over the past few months. Since the beginning of the fourth quarter of 2015 analysts have revised

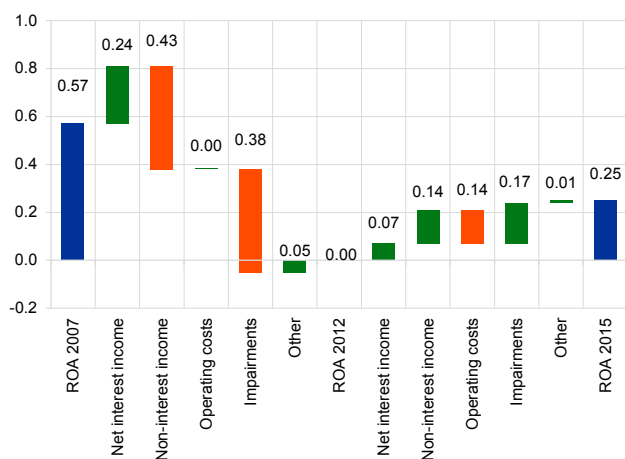
down euro area banks' net income prospects for 2016 and 2017 by around 15-20% on average.

In addition to the subdued euro area macroeconomic outlook, one growing cyclical challenge is related to banks' EME and energy exposures. While exposures to these vulnerable regions and sectors remain contained on aggregate, any further deterioration in growth prospects for vulnerable EMEs and firms in the commodity sector could also weaken some euro area banks' profitability, for instance through reduced revenues and higher credit losses.

Chart 6
Slow improvement in euro area banks' return on assets

Decomposition of changes in ROA

(2007-15; percentage of total assets)

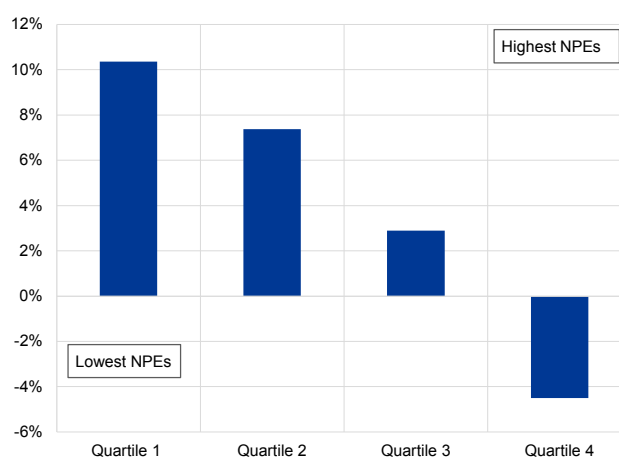


Sources: SNL Financial and ECB calculations.
Notes: Based on aggregate data for 44 euro area significant banking groups. The green and red bars indicate positive and negative contributions to changes in the return on assets (ROA), respectively.

Chart 7
High stock of non-performing assets constrains banks' lending

Loan growth by non-performing exposure ratio quartiles

(Q4 2014 – Q4 2015; average loan growth by quartile)



Sources: ECB and ECB calculations.
Note: Based on Q4 2014 non-performing exposure ratios for loans to non-financial corporations (NFCs) and growth in performing NFC loans between Q4 2014 and Q4 2015.

As for structural factors, high unresolved stocks of non-performing exposures (NPEs) hinder effective intermediation and, through lower profitability and profit retention, reduce the internal capital-generation capacity of banks. A high stock of NPEs may result in suppressed credit supply, as many borrowers remain distressed and overindebted in the absence of viable long-term restructuring solutions. Recent data on loan growth indeed suggest that banks with a high stock of non-performing loans, among other factors, have lower loan growth compared with banks with cleaner balance sheets (see **Chart 7**). A prolonged period of elevated NPEs remaining on banks' balance sheets can lead to a situation where resources are misallocated by tying up capital that could otherwise be used to increase lending to more viable firms. All in all, in countries where NPE problems are systemic, economic growth may be negatively affected, leading to adverse second-round effects for the banking system.

Going forward, a number of banks still need to adapt their business models to the new operating environment characterised by rapid technological innovation and low interest rates in a weak economic environment. Banks'

responses will differ depending on the extent to which their business activities are diversified, on the scope to (further) increase cost efficiency or on the competitive situation in the national banking markets they operate in. Furthermore, banks with high exposure to fixed rate lending should be aware of the longer-term risks related to higher interest rates.

Weak profitability expectations also remain a key financial stability concern for the insurance sector. Despite the current comfortable solvency positions supported by strong balance sheets and thus far resilient earnings, the prolonged low-yield environment continues to weaken insurers' profits as investment returns continue to decline. The insurance sector continues to react to these challenges by shifting the business mix towards products with lower guaranteed returns which are directly linked to market performance and where the investment risk is borne by the policyholder.

Banks, in particular, remain vulnerable to several triggers that could lead to sharp downward adjustments in already weak profitability. For instance, negative revisions to the economic growth path could weigh on borrowers' debt servicing ability, especially in countries currently experiencing benign market sentiment. In addition, any further deterioration in some vulnerable EMEs also has the potential to weaken euro area banks' profitability – probably mainly via confidence and financial market channels.

From a policy perspective, the high level of NPEs needs to be addressed. The resolution of systemic NPE problems will take time and requires a comprehensive strategy, involving coordination of all relevant stakeholders. Such a comprehensive strategy should include, inter alia, measures that improve the legal environment by introducing efficient insolvency frameworks as well as speeding up debt recovery. In parallel, banks should strengthen internal workout capabilities, while authorities should support the development of an efficient NPE market as well as the carve-out of specific NPE portfolios and their transfer to special-purpose vehicles.

Risk 3: Rising debt sustainability concerns in sovereign and non-financial private sectors amid heightened political uncertainty and low nominal growth

Euro area sovereign stress conditions continue to be relatively benign, but debt sustainability concerns remain. The composite indicator of systemic stress in euro area sovereign bond markets has remained close to the low levels seen before the start of the global financial crisis in 2008, not least due to the Eurosystem's measures – including stepped-up asset purchases adopted in March this year. The stable conditions reflect a gradual improvement in fiscal balances on account of the ongoing economic recovery. Fiscal positions are expected to improve in almost all euro area countries over the forecast horizon. At the same time, debt sustainability concerns remain, partly as a result of reduced reform efforts. Further progress with fiscal reforms would not only ensure long-term government debt sustainability, but also generate fiscal space to support the economic recovery. Similarly, structural

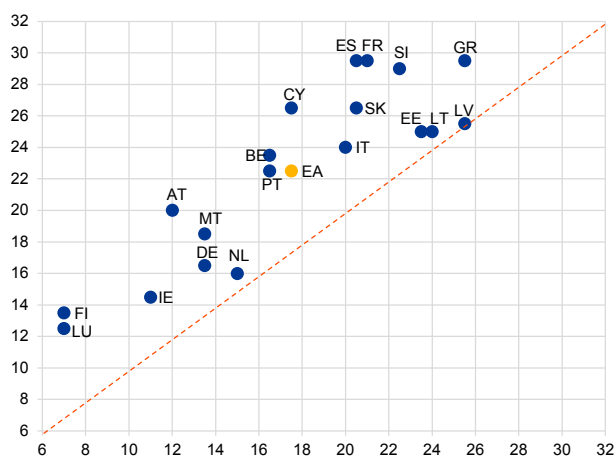
reform efforts have also lost momentum in the euro area in recent years. Debt sustainability concerns could also resurface if the economic outlook deteriorates, which would limit governments' room for manoeuvre for further fiscal adjustment.

Chart 8

Political risks pose a challenge to fiscal and structural reform implementation

Political risk ratings in individual euro area countries

(x-axis: spring 2008; y-axis: spring 2016)



Sources: PRS Group (International Country Risk Guide – ICRG) and ECB calculations. Notes: The ICRG's political risk rating comprises the following sub-categories: (1) government stability, (2) socioeconomic conditions, (3) investment profile, (4) internal conflict, (5) external conflict, (6) corruption, (7) military in politics, (8) religious tensions, (9) law and order, (10) ethnic tensions, (11) democratic accountability and (12) bureaucracy quality. The risk ratings range from zero (highest risk) to 100 (least risk). The original values were transformed by subtracting them from 100 for illustration purposes. Spring 2008 values represent data for May 2008, while figures for spring 2016 are for April 2016 (i.e. the latest available figures). The euro area (EA) value is calculated as a simple average of the values for the individual euro area economies.

Political risks have increased across the euro area and pose a challenge to fiscal and structural reform implementation and, by extension, to public debt sustainability.

Reform implementation may have become more difficult, as political risks have increased considerably in almost all euro area countries since the onset of the global financial crisis (see Chart 8). These rising political risks at both the national and supranational levels, as well as the increasing support for political forces which are seen to be less reform-oriented, may potentially lead to the delay of much needed fiscal and structural reforms. This, in turn, may cause renewed pressure on more vulnerable sovereigns and potentially contribute to contagion and re-fragmentation in the euro area.

Debt sustainability concerns also prevail in the non-financial private sector.

The non-financial corporate debt-to-GDP ratio remains high at the aggregate euro area level and in a number of euro area countries, by both historical and international standards. The level of euro area aggregated household indebtedness is lower (standing at around 65% of GDP), but the situation is very heterogeneous across the euro area. There are some countries with above-average household leverage

coupled with high and rising real estate prices. Lower than expected economic growth or a sudden worsening of financing conditions could lead to debt servicing problems for households in these countries. Overall, taking a holistic perspective to the indebtedness situation in the euro area, there are risks that an intensification of vulnerabilities in one sector could spill over to other sectors, with negative repercussions for the banking system.

Going forward, challenges to debt sustainability would in many ways be 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 amplified by liquidity risks and spillovers to the broader financial system

Risks stemming from a growing shadow banking sector remain a concern.

Across the non-bank sub-sectors, the main financial stability risks stem from parts of the investment fund sector. Over the past few years assets managed by investment

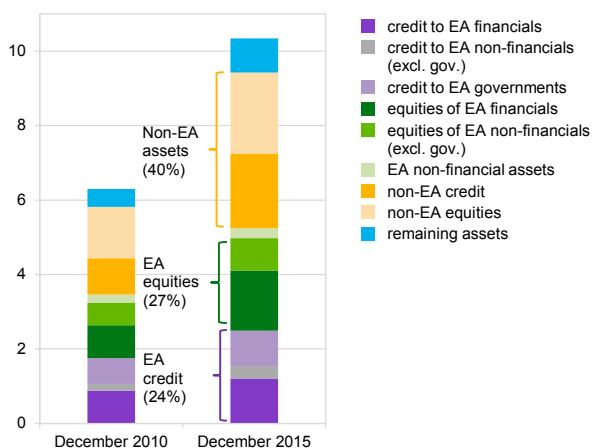
funds (other than money market funds) have expanded rapidly due to positive net inflows but also valuation effects (see [Chart 9](#)). Parts of the sector perform significant liquidity transformation and are also highly interconnected with other parts of the financial system. By the end of 2015 investment funds domiciled in the euro area were providing €1,200 billion in credit to euro area financials, €950 billion to euro area governments, and €330 billion to other euro area non-financials. Thus, higher stress in parts of the investment fund sector, triggered for instance by a sudden rise in redemptions, has the potential to propagate rapidly to other sectors.

Chart 9

Growing role of investment funds in channelling debt and equity to the domestic economy and abroad

Assets by type

(Dec. 2010; Dec. 2015; EUR trillions)



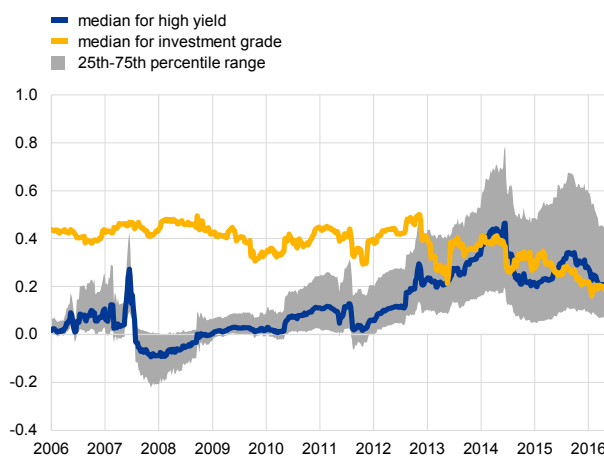
Sources: ECB and ECB calculations.
Notes: Credit includes loans and debt securities; non-financial assets include real estate and other non-financial assets. The assets are valued by market prices. EA stands for euro area.

Chart 10

Bond fund exposures to the more risky segments of the market have increased

Estimated market betas relative to a benchmark index

(Jan. 2006 – Apr. 2016)



Sources: Lipper IM, Thomson Reuters Datastream, EPFR and ECB calculations.
Notes: CAPM betas have been calculated for a rolling window of 52 weeks. The sample includes 2,600 bond funds, which are EUR-denominated, with a euro area investment focus, and not flagged as government bond funds. The underlying market benchmark is Barclay's Pan European High Yield index.

A large share of the increase in euro area investment fund total assets is related to growing exposures to non-euro area countries, including valuation effects. As a result, the euro area investment fund sector represents an important channel for inward and outward spillovers. Euro area investment funds hold €4.2 trillion of non-euro area assets, which is about 40% of total assets in the sector, up from 32% in 2010. Just as a shift in euro area sentiment can adversely affect markets abroad, a change in global risk perceptions can trigger outflows from euro area funds. In terms of country allocation, the sector's exposure to EMEs has been reduced in the recent quarters owing to valuation effects and portfolio reallocations, but also due to temporary outflows. This notwithstanding, the stress in EMEs has not triggered any sector-wide distress.

A portfolio shift towards lower-rated securities and an increase in residual maturities have persisted. Estimated market betas – measuring performance relative to either benchmark investment-grade or high-yield bond indices – point to an effective increase in risk-taking by bond funds, i.e. matching the observed shift in portfolio compositions. While return sensitivities to the investment-grade segment

have somewhat declined since 2011, sensitivities to the high-yield segment have markedly increased (see [Chart 10](#)). Since August 2014 market betas for the high-yield bond index have come down, yet remain at elevated levels compared with the period before 2012. The dispersion of market betas has also widened further, with funds in the upper 25th percentile range bearing significantly more market risk than before.

In the current low-rate environment, risk-taking by investment funds is likely to continue, which in turn may harbour the risk of a potential future unravelling.

Possible triggers for sector-wide outflows in the medium term include a further strong increase in global risk premia. Market-wide stress could lead to high redemptions or increased margin requirements, resulting in forced selling into illiquid markets. The impact of selling pressures on market conditions could be aggravated by correlated investments and herding among fund investors and asset managers.

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) will need to be gathered to adequately monitor risks. Indeed, financial and survey-based indicators continue to suggest low secondary market liquidity (see [Chart 2.16](#) in Section 2).

Policy considerations

Substantial progress made in several areas will contribute to reducing systemic risk and strengthening the resilience of the banking system. Looking ahead, the focus will be on completing the work on refining the elements of the Basel III framework by end-2016 without significantly increasing overall capital requirements. This includes the finalisation of the work aimed at addressing the problem of excessive variability in risk-weighted assets. The aim is to tackle the excessive and unwarranted variability in banks' risk measurement methods, reduce the complexity of the regulatory framework and improve the comparability of banks' capital ratios. Additional key elements to be finalised by the end of the year include agreement on the final design of the long-term liquidity requirements and the leverage ratio, as well as on the design and calibration of the revised standardised approaches for determining regulatory capital, the leverage ratio for global systemically important banks and simple and transparent securitisations. The finalisation of these elements will notably contribute towards reducing regulatory uncertainty, which has been considered by the banking industry as a key element to unlock funding and avoid further postponement of investment decisions. Importantly, this work will be completed with the focus on not significantly increasing overall capital requirements.

Work is also ongoing at the international and EU levels on the review of the regulatory standards for the prudential treatment of banks' exposures to sovereigns, but this work has a longer time frame. This review is motivated by the experience from the last financial crisis and the significant challenges that the

sources and channels of sovereign risk can pose to the banking system. This work is being carried out in a careful, gradual and holistic manner given that any change is expected to have a pervasive impact across the financial system. From the ECB's perspective, three principles should guide this work. First, it should be acknowledged that a regulatory change is needed. Second, due care should be taken to avoid an adverse impact on market functioning. And third, an international approach should be followed in the context of the Basel Committee on Banking Supervision's work.

Further key areas of macroprudential relevance include the revision of the crisis management and resolution framework. This framework aims to ensure that there will be sufficient loss-absorbing and recapitalisation capacity in banks to implement an orderly resolution, while minimising the impact on financial stability and avoiding the use of public money. The legislative proposal for a European Deposit Insurance Scheme (EDIS), together with a communication on completing banking union via "risk-mitigation" measures, are also considered to be key to preserve financial stability.

Finally, a range of regulatory initiatives aim to address risks in financial markets and financial infrastructures. In particular, enhancing prudential rules for market-based finance and investment funds, as well as setting oversight requirements for systemically important payment systems, as has been done by the ECB Regulation on such payment systems, are at the centre of attention from a macroprudential perspective. These are complemented by the European Commission's initiative to establish a capital markets union (CMU), which aims to establish a more diversified financial system that could increase the shock-absorbing capacity of the European economy and strengthen cross-border risk-sharing, thereby contributing to financial stability. With regard to the insurance sector, Solvency II – the new EU supervisory framework for insurance – has been applicable since 1 January 2016 and represents a major step towards supervisory convergence. At the international level, the assessment methodology for global systemically important insurers (G-SIIs), used since 2013, is currently under discussion.

A range of macroprudential measures have been implemented or announced in euro area countries over the last six months. The measures introduced have mainly been related to implementing the countercyclical capital buffer and a framework for systemically important institutions pursuant to the requirements of the Capital Requirements Directive IV. Additional measures targeted at risks related to residential real estate have been adopted in some euro area countries, with the aim of limiting undesirable developments in domestic property markets.

1 Macro-financial and credit environment

Macro-financial conditions have become more challenging in the euro area. Concerns about the state of the global economy, including the soundness of economic fundamentals in emerging markets, rising (geo-)political risks and renewed bouts of financial and commodity market volatility, imply continued downside risks to the ongoing moderate economic recovery in the euro area. Globally, the prospective increasing monetary policy divergence in major advanced economies may harbour the potential to trigger risk repricing in certain regions, markets and asset classes, and an abrupt adjustment in global capital flows.

Euro area **sovereign stress** has remained contained, as sovereign financing conditions have tended to improve in terms of both pricing and duration amid ongoing Eurosystem asset purchases. At the same time, fiscal fundamentals remain fragile, given the combination of a low nominal growth environment and signs of waning fiscal and structural reform efforts. These factors, when combined with heightened political risks, suggest challenges for the sustainability of public finances.

The recovery of the euro area **non-financial private sector** continues to be supported by favourable financing conditions. Unconventional measures by the ECB, in particular, have translated into the improved availability and cost of funding. Amid these favourable financing conditions, financial fragmentation across countries and firm sizes has fallen. With time, the ongoing economic recovery should also help bolster the improving but still muted income and earnings position of euro area households and non-financial corporations, thereby mitigating the risks associated with a continued debt overhang which persists in some countries. At the same time, the recovery of euro area property markets has gained some further momentum across countries and property types. While overall residential property valuations remain contained, prime commercial property valuations have moved further above long-term averages. That said, price movements and valuations continue to diverge at the country level in both the residential and commercial property segments. Against this backdrop, targeted action may be required in some countries and market segments to counter in a timely manner any potentially emerging risks to financial stability.

1.1 Ongoing economic recovery amid prominent external risks

The euro area economic recovery continued in 2015 and early 2016. Domestic demand remained the main pillar of growth, with a temporary slowdown in private consumption towards the end of last year being largely compensated for by a simultaneous pick-up in private investment activity and government spending. At the same time, the ongoing slowdown in emerging market economies weighed on euro area export growth, particularly in the latter half of 2015. The recovery is being chiefly supported by the very accommodative monetary policy stance. Political and

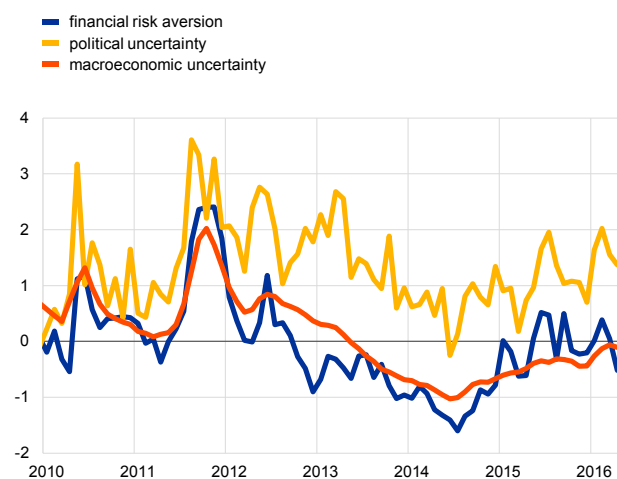
financial market uncertainty has decreased lately following a spike at the beginning of this year amid renewed political tensions at both the national and EU levels as well as heightened financial market uncertainty as a result of global growth concerns (see [Chart 1.1](#)). Despite the ongoing recovery, the more moderate growth environment in the euro area contrasts with more favourable fundamentals in other major advanced economies, notably the United States, amid high uncertainty regarding the strength and pace of economic expansion as well as inflation prospects (see [Chart 1.2](#)).

Chart 1.1

Political and financial market uncertainty has declined recently following a spike at the turn of 2015-16

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

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



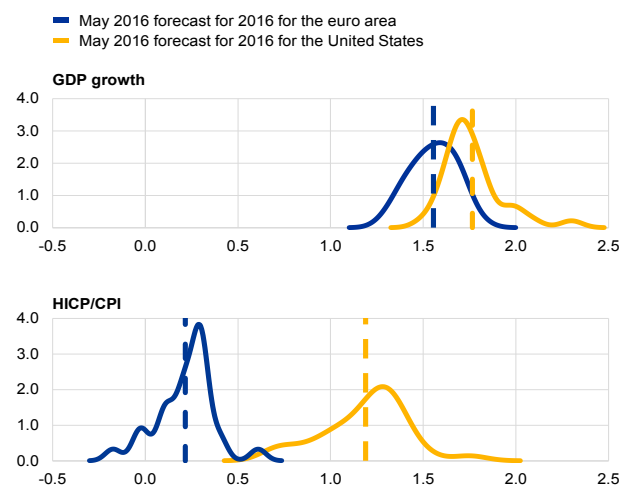
Sources: Consensus Economics, Baker, Bloom and Davis (www.policyuncertainty.com), European Commission, ECB and ECB calculations.
 Notes: Mean for the period Q1 1980 – Q4 2015. Macroeconomic uncertainty is captured by examining a number of measures of uncertainty compiled from various sources, namely: (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. For further details on the methodology, see "How has macroeconomic uncertainty in the euro area evolved recently?", *Monthly Bulletin*, ECB, October 2013..

Chart 1.2

Low nominal growth in the euro area contrasts with more benign conditions in the United States

Distribution of the 2016 real GDP growth and HICP/CPI forecasts for the euro area and the United States

(probability density)



Sources: Consensus Economics and ECB calculations.
 Note: The dashed lines represent the average real GDP growth and HICP/CPI forecast values.

The March 2016 ECB staff macroeconomic projections expect the economic recovery to proceed at a slower pace than anticipated in the December 2015 projections. This reflects in particular weakening global growth and a strengthening of the effective exchange rate of the euro. At the same time, more persistent factors, such as the ongoing process of balance sheet adjustment in the financial and non-financial private sectors, sluggish structural reform implementation and still high unemployment rates in several countries continue to weigh on the pace of recovery. Still, an accommodative monetary policy stance, improvements in the labour market, lower energy prices and some fiscal easing, partly related to the influx of refugees, should underpin economic activity in the near and medium term, in particular by boosting domestic demand. Accordingly, the March 2016 ECB staff macroeconomic projections for the euro area envisage real GDP growth of 1.4% for 2016, which is expected to accelerate moderately to 1.7% in 2017 and 1.8% in 2018.

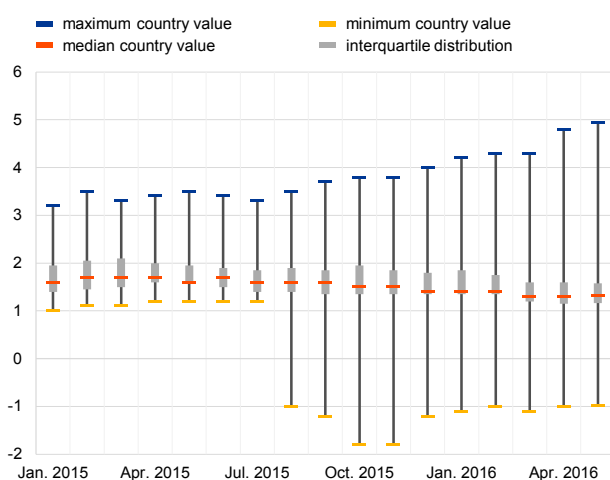
The risks to the euro area growth outlook remain tilted to the downside. They relate in particular to the heightened uncertainties regarding developments in the global economy, as well as to broader geopolitical risks. Uncertainties stemming from developments in emerging economies remain prominent. In particular, a possible further slowdown of the Chinese economy has the potential to affect the euro area economy via the trade and confidence channels, albeit to varying degrees across countries. From the financial stability perspective, additional downside risks relate to a potential re-intensification of sovereign stress at the euro area country level as well as a further increase in uncertainty as reflected by increased global risk aversion, heightened financial market volatility and rising political risk.

Chart 1.3

Overall economic prospects continue to diverge considerably not only at the country level...

Distribution of real GDP growth forecasts in the euro area for 2016

(Jan. 2015 – May 2016; percentage changes per annum)



Sources: Consensus Economics and ECB calculations.

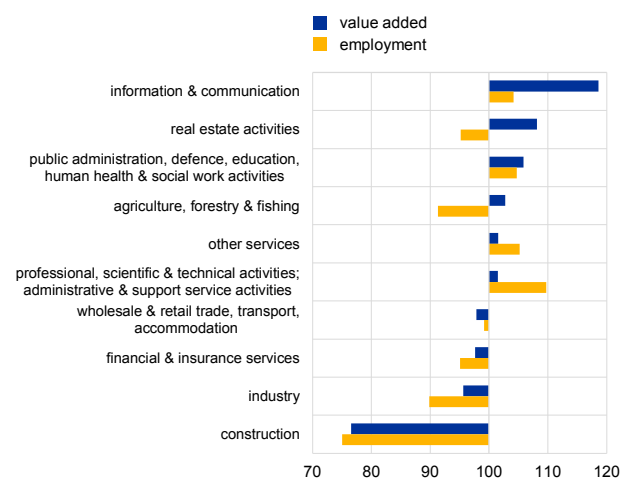
Note: The chart shows the minimum, maximum, median and interquartile distribution across the 11 euro area countries surveyed by Consensus Economics (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain).

Chart 1.4

... but also depending on the sector of economic activity and the level of employment

Levels of value added and employment in various sectors of economic activity in 2015 compared with 2008

(Q1 2008 vs. Q4 2015; index: Q1 2008 = 100)



Sources: Eurostat and ECB calculations.

Fragmentation at the country and sector levels remains a challenge. The strength of the recovery has remained uneven at the country level, as indicated by the relatively wide cross-country divergence of projected GDP growth rates for 2016 (see [Chart 1.3](#)), with Greece and Ireland at the lower and upper end of the distribution. Similarly, variation across sectors remains considerable, with output in industry, construction, trade and financial services still below pre-crisis levels, while value added and employment are increasing particularly strongly in some services sub-sectors, such as information and communication (see [Chart 1.4](#)). In line with the ongoing gradual recovery, labour market conditions have continued to improve, with the aggregate euro area unemployment rate falling to 10.2% in March 2016 – the lowest level observed since the summer of 2011. However, cross-country variation remains high, as weak (albeit improving) labour market conditions in euro area

countries most affected by the financial crisis (e.g. Greece, Spain) contrast with relatively tight labour markets in other euro area countries (e.g. Austria, Germany).

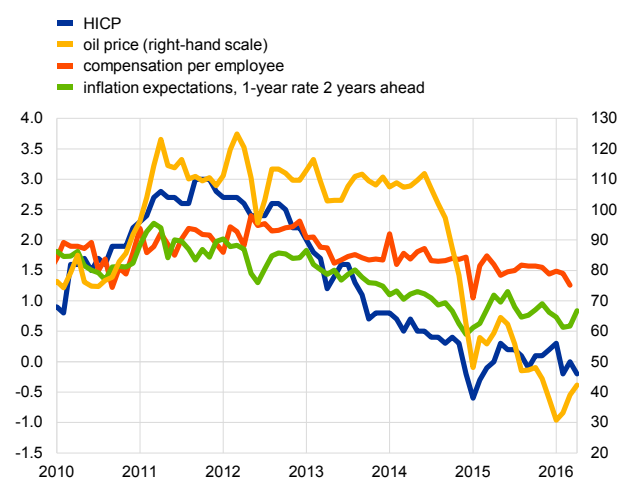
While risks of deflation have receded in view of resolute ECB policy action, nominal economic growth remains subdued amid low inflation outturns. HICP inflation has fallen to low levels as a result of a confluence of cost-push and demand-pull factors, in particular a marked drop in global oil prices (see [Chart 1.5](#)). Very low rates of consumer price inflation may have negative financial stability implications via adverse debt dynamics.¹ ECB policy action has been critical in ensuring that the current low-inflation environment does not become entrenched through second-round effects on wage and price-setting. Following a further sharp drop in oil prices at the turn of 2015-16, the March 2016 ECB staff macroeconomic projections for the euro area envisage a pick-up in HICP inflation from 0.1% in 2016 to 1.3% in 2017 and 1.6% in 2018.

Chart 1.5

Risks of a prolonged period of low inflation have remained elevated

Developments in the HICP, market-based inflation expectations, compensation per employee and the oil price

(Jan. 2010 – Apr. 2016; percentages, percentage changes; USD per barrel)



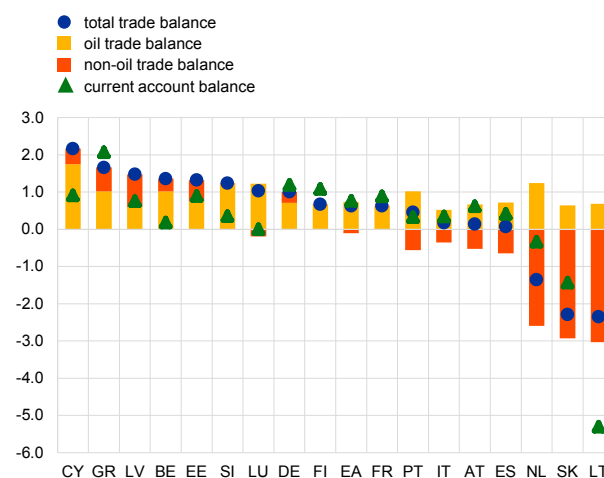
Sources: Bloomberg and ECB.

Chart 1.6

External rebalancing has continued across the euro area, partly supported by lower oil prices

Breakdown of changes in goods trade and current account balances across the euro area between 2014 and 2015

(percentages of GDP)



Sources: Eurostat and ECB.

Notes: The goods trade balance is retrieved from Eurostat's external trade statistics. Ireland and Malta are excluded. EA stands for euro area.

The external rebalancing in euro area countries most affected by the financial crisis has continued, supported by low oil prices. The current account balances continued to improve in most of these countries (most notably Greece and Cyprus) over the course of 2015, predominantly on account of the shrinking oil bill, but also due to continued adjustments in relative prices and costs (see [Chart 1.6](#)). For countries with large pre-crisis current account surpluses, the surpluses remained at elevated levels and in some cases increased further in 2015. As a result, the current account surplus of the euro area widened from around 2% in 2014 to 3% of GDP in

¹ For further details, see Box 1 on "Financial stability challenges posed by very low rates of consumer price inflation" in *Financial Stability Review*, ECB, May 2014.

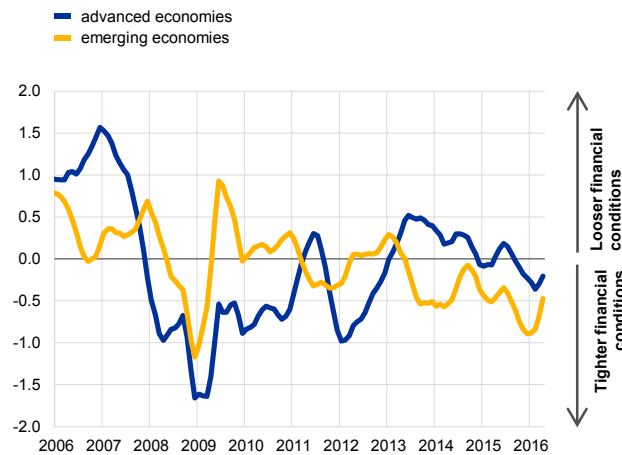
2015. Looking ahead, the impact of low oil prices is expected to be gradually offset by the downward pressures on current account balances via higher imports related to the projected upturn in domestic demand in the euro area.

Global economic prospects have become more subdued amid uneven developments across major economic areas. The world economy lost momentum in 2015 as vulnerabilities related to a potential sharp repricing of risk partly materialised towards the end of the year. In terms of the growth pattern, economic activity in advanced economies continued on a modest recovery path, notwithstanding some weakness at the turn of the year. Economic growth in emerging markets decelerated further amid tightening financial conditions, although the tightening has partly reversed over recent months (see [Chart 1.7](#)). Overall, global growth prospects became more muted at the turn of 2015-16, as heightened political uncertainty, ongoing geopolitical tensions as well as volatility in global commodity markets in conjunction with the ongoing rebalancing in emerging economies affected confidence more broadly and reignited risk aversion in global financial markets.

Chart 1.7
Financial conditions have tightened across the globe, in particular in emerging economies

Financial condition indices

(Jan. 2006 – Apr. 2016; standardised with a mean of 0 and a standard deviation of 1)

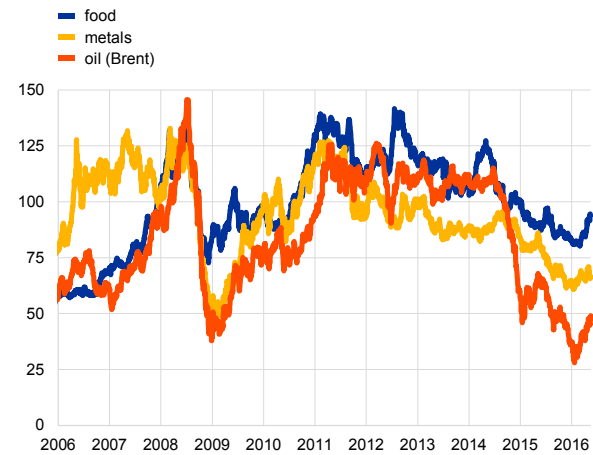


Sources: ECB calculations and Haver Analytics.
Notes: The financial condition indices are estimated for individual countries by taking the first principal component of a wide set of financial time series. They are conditional on the business cycle (without considering monetary policy), with the data series first regressed on GDP and inflation. "Advanced economies" comprise the financial condition indices for the United States, Japan and the United Kingdom. "Emerging economies" cover the financial condition indices for the BRIC countries and Turkey. For more details on the underlying methodology, see Wacker, K., Lodge, D. and Nicoletti, G., "Measuring financial conditions in major non-euro area economies", *Working Paper Series*, No 1743, ECB, November 2014.

Chart 1.8
Commodity markets have remained under pressure in all major market segments

Selected commodity price developments

(Jan. 2006 – May 2016; index: 2010 = 100; USD per barrel)



Source: Bloomberg.

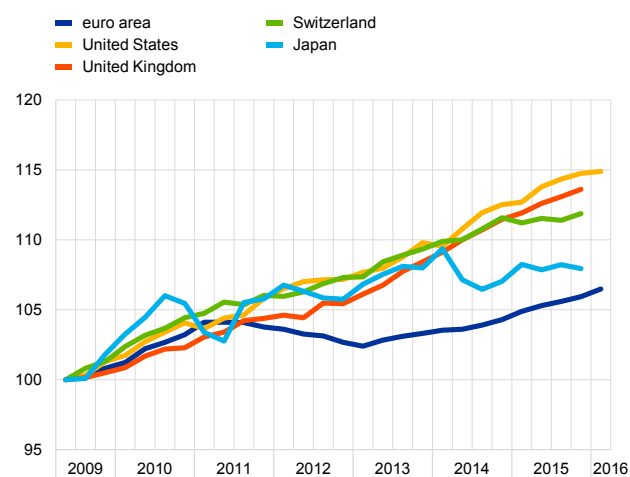
As global growth prospects weakened, commodity markets continued to adjust, with demand-side drivers becoming increasingly relevant. The drop in oil prices that started in mid-2014 continued at the turn of 2015-16, with oil prices reaching their lowest level in more than a decade in early 2016 (see [Chart 1.8](#)). Alongside the continued global oil supply overhang, oil price developments were

increasingly driven by lower demand as a result of the slowdown in emerging economies and – as reflected by unusually high oil price volatility – uncertainties regarding the outlook for oil market fundamentals (see [Chart 2](#) in the Overview). Thus, compared with the initial predominantly supply-side-driven drop in oil prices, the demand-driven oil price decline may have provided less support to global economic activity. Also, the potential benefits to aggregate demand in oil-importing economies may have been offset by weaker global trade, rising macro-fiscal imbalances in oil-exporting economies and any potential financial stability concerns surrounding the oil-producing sector. Oil prices have trended upwards since the end of January, reflecting a moderation in the global oil supply overhang as well as better than expected global oil demand. However, oil price volatility, although lower than the seven-year high reached in mid-February, remains a concern.

Chart 1.9
Economic trends diverge across major advanced economies

GDP levels in selected advanced economies

(Q2 2009 – Q1 2016; index: Q2 2009 = 100)



Sources: Eurostat, OECD and ECB calculations.

The economic recovery in advanced economies has continued at a slower pace against the backdrop of deteriorating global economic prospects. Economic growth in advanced economies outside the euro area has continued to be supported by low oil prices, improving labour market conditions, accommodative monetary policies as well as receding headwinds from private sector deleveraging and fiscal consolidation in several countries. Having slowed in general towards the end of 2015 amid lower external demand and in some countries also weaker consumer spending (e.g. the United States, Japan), the underlying multi-speed recovery across countries (see [Chart 1.9](#)) is increasingly translating into divergent monetary policies, as the start of monetary policy tightening in the United States contrasts with further easing in other advanced economies (see [Chart 2.5](#)).

While growth prospects appear resilient in most advanced economies, downside risks to the growth outlook remain. The negative impact of low oil prices

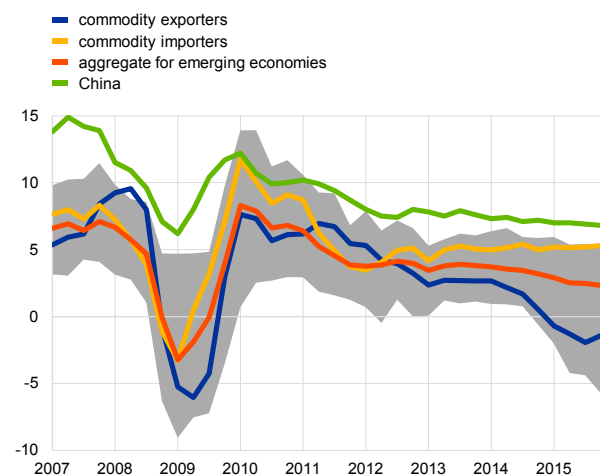
on energy-related investment spending in oil-producing advanced economies, in particular the United States, is partially offsetting the positive impact via consumer spending. Furthermore, for some countries (e.g. the United States, Japan) major challenges relate to ensuring the long-term sustainability of public finances, with underlying fiscal imbalances – if unaddressed – highlighting the risk of a potential reassessment of sovereign creditworthiness. At the same time, legacy macro-financial vulnerabilities (e.g. high private sector indebtedness) in some countries (e.g. the United Kingdom, Sweden, Denmark) may be further amplified, particularly against the backdrop of a strong rise in residential house prices, which has triggered a policy response in some countries (e.g. the United Kingdom). Finally, heightened political uncertainty, for example in the context of the upcoming presidential elections in the United States or the planned referendum on EU membership in the United Kingdom, could represent a drag on business and consumer confidence and, eventually, economic growth.

Chart 1.10

Growth momentum has weakened across emerging economies, with oil exporters particularly hard-hit

GDP growth in emerging economies

(2007-15; annual percentage changes)



Sources: National sources and Haver Analytics.

Notes: The lines represent PPP-weighted averages of GDP growth in emerging market economies. The shaded area shows the 10th-90th percentile range of growth across the sample. Commodity-importing economies include: Hong Kong, India, Singapore, South Korea, Taiwan, Thailand and Turkey. Commodity-exporting countries include: Brazil, Chile, Colombia, Indonesia, Malaysia, Mexico, Russia, Saudi Arabia, South Africa and Venezuela.

Economic growth prospects in emerging economies have weakened more considerably, albeit diverging across countries and regions.

In general, cyclical challenges in a number of emerging economies in the late phase of the credit cycle are being compounded by lower commodity prices, which has adversely affected economic growth in commodity (in particular oil) exporters (see [Chart 1.10](#)), such as Brazil or Russia. At the same time, domestic and/or external macro-financial imbalances, tighter financial conditions, geopolitical tensions and heightened political uncertainty continue to act as an additional drag on economic growth in a number of countries. Moreover, the transition to a more moderate growth path in the context of the ongoing rebalancing from an export-led to a more consumption-driven growth path in China implies adverse knock-on effects for other Asian and Latin American economies with close trade and financial links to the Chinese economy. Overall, economic activity in emerging markets is likely to remain moderate. Within the emerging market universe, economic conditions have remained relatively benign in emerging Europe, notably the non-euro area EU countries in central and eastern Europe, against the

backdrop of relatively solid fundamentals and the gradually improving economic outlook for the euro area. This development contrasts with weaker growth dynamics in emerging Asia and Latin America where several countries have lost further momentum or are experiencing an outright recession (e.g. Brazil and Venezuela).

Risks to the growth outlook in emerging economies are tilted mainly to the downside.

First and foremost, a further drop in or a sustained low level of oil prices may challenge the macro-fiscal stability of oil-exporting emerging economies further, in particular that of countries with only limited monetary and fiscal room for manoeuvre. Also, a potential further tightening of external financial conditions – partly associated with the normalisation of US monetary policy – is likely to additionally constrain economic activity in emerging economies which are highly dependent on capital inflows. In fact, past credit excesses and the related debt accumulation over the last decade (see [Chart 1.11](#)) expose many emerging economies to the risk of sudden capital flow reversals, possible exchange rate shocks and increasing credit risk should growth prospects deteriorate further (see [Box 1](#)). Even if currency mismatches on sovereign and corporate balance sheets have tended to decline given the growing issuance of domestic currency-denominated debt in many emerging economies, 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. Lastly, decelerating growth prospects in China, where increasing leverage and a large shadow banking sector also indicate rising risks to financial stability, could unearth more general concerns about the macro-financial health of major emerging

economies, affect global confidence and trigger capital outflows from emerging markets, highlighting the potential risk of a disorderly and broad-based unwinding of global capital flows, ensuing corrections in asset prices and sharp exchange rate movements (see [Chart 1.12](#)).

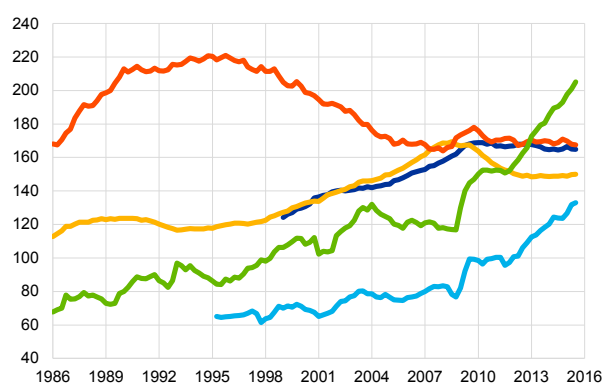
Chart 1.11

Private debt has increased considerably in emerging economies since the onset of the financial crisis

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

(Q1 1986 – Q3 2015; percentages of GDP)

- euro area
- China
- United States
- emerging market economies
- Japan



Source: BIS.
Note: Private debt refers to non-financial private sector debt, i.e. the sum of household and non-financial corporate debt.

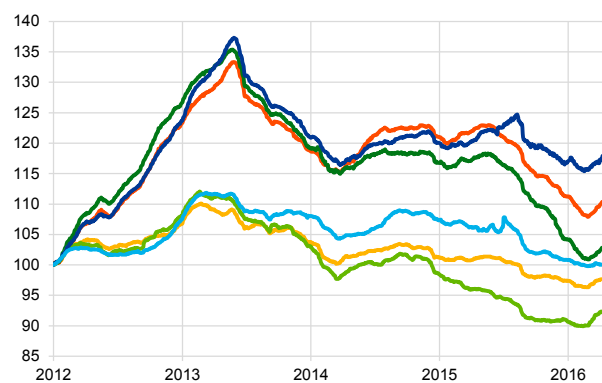
Chart 1.12

Emerging economies have seen substantial capital outflows, but have recovered somewhat lately

Equity and bond flows to advanced and emerging market economies

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

- eastern Europe, the Middle East and Africa (bonds)
- eastern Europe, the Middle East and Africa (equities)
- Latin America (bonds)
- Latin America (equities)
- Asia (bonds)
- Asia (equities)



Source: EPFR.
Notes: Bonds include both sovereign and corporate bonds. The chart shows equity and bond flows as a percentage of assets under management computed as chained indices.

Amid this ongoing cross-regional shift in global growth dynamics, macro-financial risks to euro area financial stability increasingly stem from external factors. In this context, the ongoing cyclical slowdown coupled with a structural rebalancing towards a more moderate growth path in emerging economies, continued heightened geopolitical tensions and diverging monetary policies in major advanced economies represent the major causes for concern. In addition to raising uncertainty regarding the pace and sustainability of the economic recovery at both the euro area and global levels, these factors also have the potential to affect confidence and trigger renewed tensions in global financial and commodity markets and prompt a disorderly unwinding of global capital flows. That said, in a low nominal growth environment, macro-financial risks also continue to originate from within the euro area. In particular, the ongoing balance sheet repair in both the private and public sectors in several countries, continued (albeit diminishing) fragmentation of the real economy as well as the sluggish pace of structural reforms continue to weigh on the underlying euro area growth momentum.

Box 1

Private credit overhang in emerging economies and risks to euro area financial stability

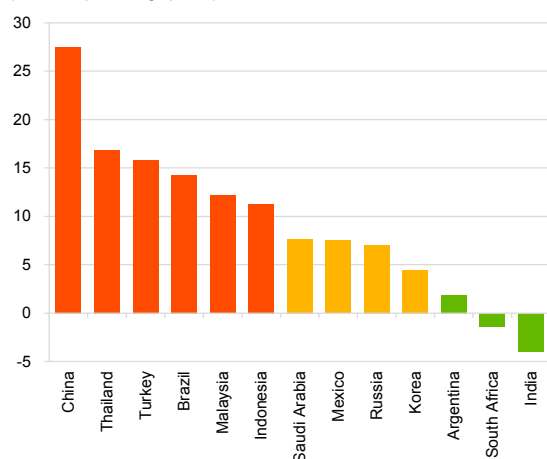
Many emerging market economies (EMEs) have seen a rapid expansion of credit to the private sector since the onset of the global financial crisis. Strong credit growth was often driven by abundant capital inflows on the back of both positive growth differentials and the global search for yield by investors amid accommodative macroeconomic policies in advanced economies. As a result, several EMEs appear to be facing a large credit overhang, with a potential for disorderly unwinding amid deteriorating economic growth prospects. The prospective implications of any such correction could reverberate beyond the affected EMEs given their growing economic and financial linkages with the rest of the world in recent years.

Chart A

Rapid credit growth is a concern in a number of emerging economies, notably China

Credit-to-GDP gaps for selected EMEs

(Q3 2015; percentage points)



Sources: BIS and ECB calculations.

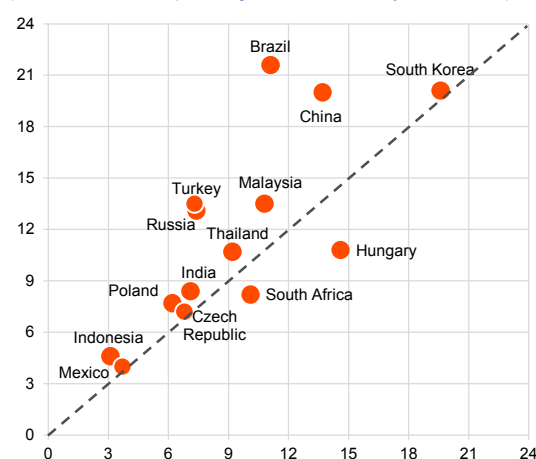
Notes: The credit-to-GDP gap is calculated as the difference between the private credit-to-GDP ratio as at September 2015 and its long-term trend. The thresholds for the red and yellow bars are 10 and 2 percentage points, respectively, following the BIS approach; for more details, see *BIS Quarterly Review*, March 2016.

Chart B

Most emerging economies have seen rising debt service ratios since the financial crisis

Debt service ratios for selected EMEs

(Q4 2007 vs. Q3 2015; percentages; x-axis: Q4 2007; y-axis: Q3 2015)



Source: BIS.

Note: The debt service ratio reflects the share of income used to service debt in the non-financial private sector.

Financial stability concerns stem from the historical regularity that rapid growth in private credit that leads to an excessively large stock of debt is often a leading indicator of subsequent financial turmoil.² As the expansion of credit to the private sector has outpaced GDP growth in a number of EMEs over the near decade since the onset of the global financial crisis, credit-to-GDP ratios are substantially above their long-term trend in several countries (see **Chart A**), while credit gap levels have risen over the past few years in some of those countries. While contributing to fundamental financial deepening, the sheer pace of credit growth may suggest potential vulnerabilities in several EMEs, notably China. Clearly, risks are accentuated in countries with a substantial foreign currency-denominated component of the resulting debt overhang.

² See, for example, Schularick, M. and Taylor, A., "Credit booms gone bust: Monetary policy, leverage cycles, and financial crises, 1870-2008", *American Economic Review*, Vol. 102(2), 2012.

The ongoing economic slowdown may indicate heightened credit risk for banks via

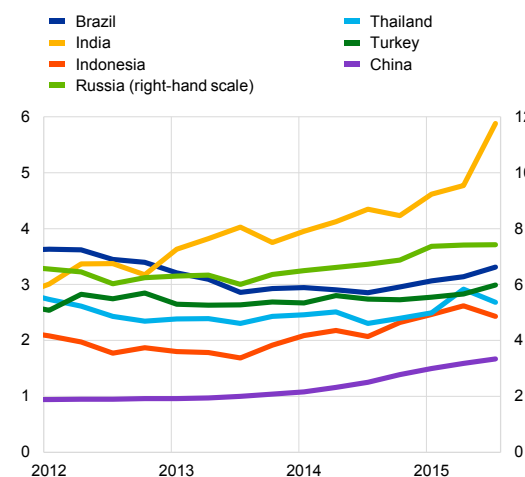
deteriorating asset quality. In fact, past credit excesses and the related high debt burden may challenge borrowers’ debt servicing capabilities. Despite relatively low interest rates, mounting debt levels have pushed up debt service ratios for the private sector in most EMEs, notably Brazil and China (see **Chart B**). This, together with low interest coverage ratios of firms in a number of EMEs, may increase the likelihood that local borrowers run into debt servicing difficulties in the event of a further slowdown in economic growth. That said, bank loan quality has started to deteriorate since early 2014 in a number of EMEs, even though non-performing loan (NPL) ratios – being a lagging indicator – are still at relatively low levels (see **Chart C**). In China, despite the rapid accumulation of credit, looking at bank accounts suggests an NPL ratio of about 1.5%. At the same time, estimates based on Chinese firm-level balance sheet data suggest that the NPL ratio could be in the higher single digits, while a stress scenario could yield even higher figures.

Chart C

Non-performing loan ratios have started to rise in many EMEs, albeit from low levels

Non-performing loan ratios in selected emerging economies

(Q1 2012 – Q4 2015; percentages)



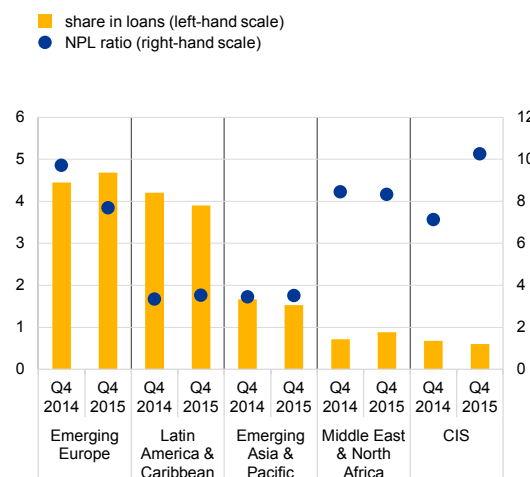
Source: IMF Financial Soundness Indicators.

Chart D

Euro area banks’ EME exposures are limited, but asset quality problems vary across regions

Euro area banks’ exposures and non-performing loan ratios in selected emerging market regions

(Q4 2014; Q4 2015; percentage of total loans; weighted averages)



Source: ECB.
Note: Based on a sample of significant banking groups that report the geographical breakdown of their exposures.

Potential spillovers from EMEs to the euro area via direct banking exposures are limited.

Euro area banks’ overall EME exposures have dropped in recent years given banks’ increased home bias and balance sheet deleveraging. The cross-border claims of euro area banks on emerging economies account for about 12% of their total loan portfolio. The bulk of these exposures are to emerging Europe and Latin America, while exposures to emerging Asia, the Middle East and North Africa (MENA) as well as the Commonwealth of Independent States (CIS) are relatively contained (see **Chart D**). Euro area banks are mostly confronted with asset quality problems in emerging Europe, MENA and the CIS, with the latter two regions also hard-hit by the ongoing turmoil in global commodity markets. That said, given the economic slowdown in many Asian and Latin American economies, banks are likely to incur higher loan losses also on those exposures going forward.

All in all, the direct impact of a potential further worsening of credit quality in emerging markets should not represent a systemic risk for the euro area. Nonetheless, the presence of localised pockets of risk cannot be ruled out and individual euro area banks with more material exposures to emerging economies may face heightened earnings risks and asset quality problems. That said, a more broad-based emerging market shock could have more pronounced implications for the euro area, in particular if heightened concerns about the economic outlook were to trigger volatility in financial markets and adversely affect global confidence.

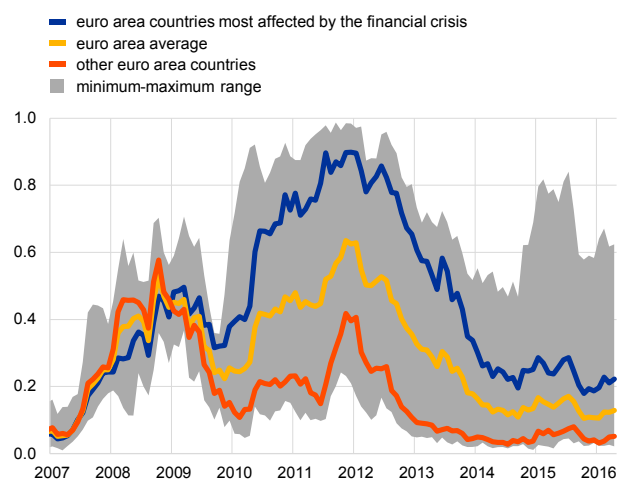
1.2 Waning reform efforts and rising political risks may challenge the sustainability of public finances

Chart 1.13

Sovereign tensions have remained contained in most (but not all) euro area countries

Composite indicator of systemic stress in euro area sovereign bond markets

(Jan. 2007 – Apr. 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, Finland, France, Germany, 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, Finland, France, Germany and the Netherlands. The SovCISS combines data from the short end and the long end of the yield curve (two-year and ten-year maturity 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. The raw indicators are homogenised by applying the probability integral transform based on the empirical cumulative distribution function; as a result of this transformation, the SovCISS can assume values between zero and one.

Euro area sovereign stress conditions continue to be relatively benign, albeit with cross-country variation. The composite indicator of systemic stress in euro area sovereign bond markets has remained close to the levels seen before the start of the global financial crisis in 2008, not least due to the Eurosystem's public sector purchase programme. Underlying this aggregate indicator, diverging trends in sovereign stress persist across country groups. In particular, a recent slight uptick in sovereign stress in euro area countries most affected by the financial crisis contrasts with continued favourable conditions in other euro area countries (see **Chart 1.13**). Sovereign stress appears to have increased in Greece and Portugal where country-specific issues (e.g. uncertainty regarding programme implementation and the refugee crisis in Greece, as well as banking sector uncertainty in Portugal) were to some extent compounded by the adverse ramifications of the repricing of European bank stocks at the start of the year for the respective sovereigns.

Headline fiscal balances continue to improve, benefiting from the ongoing economic recovery and the low interest rate environment. Fiscal deficits in the euro area declined from 2.6% of GDP in 2014 to 2.1% in 2015 and are expected to fall further in 2016, although at a slower pace than in previous years. According to the European Commission's spring 2016 forecasts, the aggregate euro area fiscal deficit is projected to drop to 1.9% of GDP in 2016 and 1.6% in 2017, driven by gradually improving cyclical conditions

and lower interest expenditure as a consequence of the Eurosystem's public sector purchase programme. Headline fiscal balances are expected to improve – at least slightly – in almost all euro area countries over the forecast horizon. Despite this

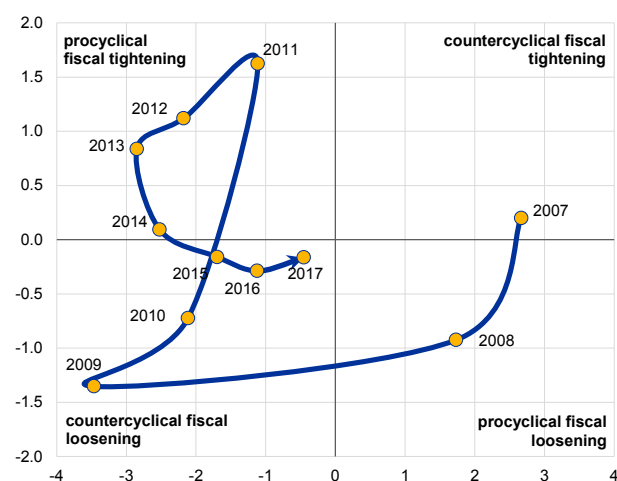
overall improvement in the euro area fiscal position over recent years, underlying fiscal challenges remain. In fact, structural budget balances are projected by the European Commission to deteriorate in a number of countries in 2016 and 2017, further challenging the achievement of the medium-term objectives set by some euro area countries in their stability programmes. At the same time, the fiscal costs of managing the refugee crisis – albeit contained at the aggregate euro area level – may present additional challenges for some euro area countries.

Chart 1.14

Fiscal consolidation has slowed, following major adjustments in the period 2011-13...

Output gap and changes in the cyclically adjusted primary budget balance in the euro area

(2007–17; x-axis: output gap; y-axis: change in cyclically adjusted primary budget balance)



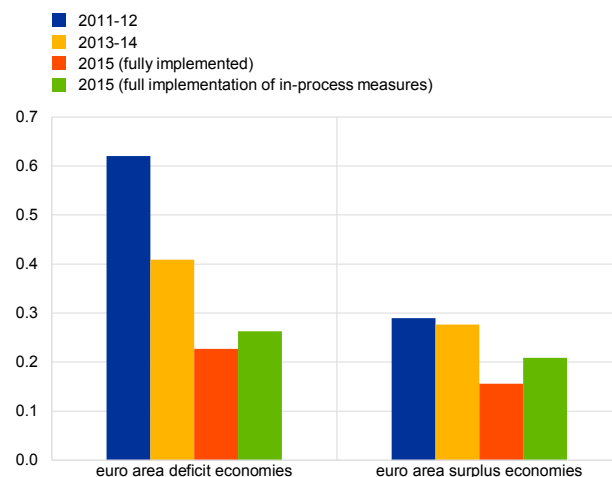
Sources: European Commission and ECB calculations.

Chart 1.15

... while structural reform efforts have lost momentum across the euro area as well

Reform responsiveness indicator and the hypothetical level of responsiveness in 2015 based on two different scenarios

(2011-15; share of implemented *Going for Growth* recommendations)



Source: OECD.

Note: The reform responsiveness indicator measures the extent to which countries have followed up on the OECD's *Going for Growth* recommendations, but they do not aim to assess overall reform intensity per se, as the indicators do not take into account reforms carried out in non-priority areas and do not quantify the importance of each individual measure. For methodological details, see Annex 2.A1 of *Going for Growth 2010*, OECD, March 2010. According to the OECD, euro area surplus economies cover Austria, Belgium, Germany, Finland, Luxembourg and the Netherlands, i.e. countries for which the current account surplus was on average larger than 1% of GDP over the period 2000-05. Euro area deficit economies include all other euro area OECD countries (Estonia, France, Greece, Ireland, Italy, Portugal, Slovakia, Slovenia and Spain).

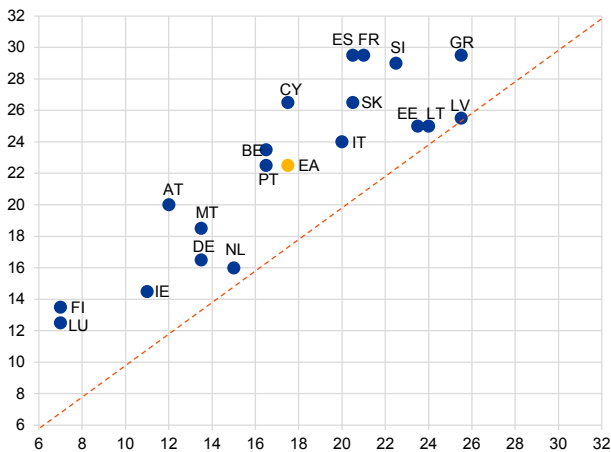
Reform efforts appear to have dwindled amid low sovereign stress and rising political risks. Fiscal consolidation efforts have slowed in the euro area following major procyclical adjustments in the period 2011-13 (see **Chart 1.14**), while proceeding at an uneven pace across countries. As cyclical economic conditions improve, further progress with fiscal reforms would not only bolster long-term government debt sustainability, but would also generate fiscal space for effective countercyclical policies going forward, which is currently limited to a small number of countries given high government debt levels. In this context, altering the composition of the budget might help support economic conditions by cutting distortionary taxes and unproductive expenditure. Overall, structural reform efforts have lost momentum in the euro area in recent years (see **Chart 1.15**). While deeper structural reforms would bring long-term benefits by boosting growth potential without endangering fiscal solvency, political risks – having increased for almost all euro area countries

since the onset of the global financial crisis (see [Chart 1.16](#)) – appear to be increasingly interfering with reform implementation. Rising political risks at both the national and supranational levels, as well as the increasing support for populist political parties which are seen to be less reform-oriented, may potentially lead to the delay of much needed fiscal and structural reforms and cause renewed pressures on more vulnerable sovereigns.

Chart 1.16
Political risks pose a challenge to fiscal and structural reform implementation

Political risk ratings in individual euro area countries

(x-axis: spring 2008 vs. y-axis: spring 2016)

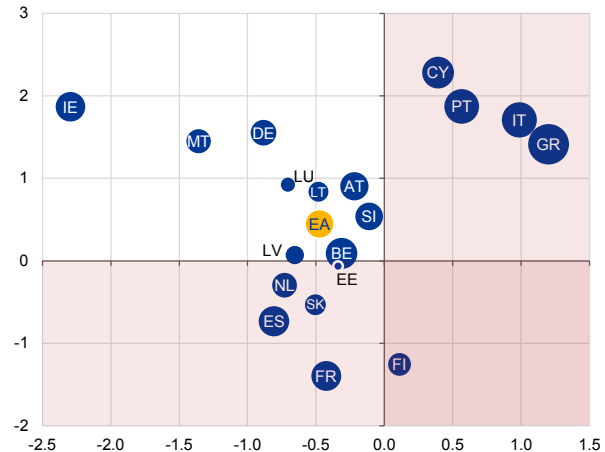


Sources: The PRS Group (International Country Risk Guide) and ECB calculations.
Notes: The ICRG's political risk rating comprises the following sub-categories: (1) government stability, (2) socioeconomic conditions, (3) investment profile, (4) internal conflict, (5) external conflict, (6) corruption, (7) military in politics, (8) religious tensions, (9) law and order, (10) ethnic tensions, (11) democratic accountability and (12) bureaucracy quality. The risk ratings range from zero (highest risk) to 100 (least risk). Original values were transformed by subtracting them from 100 for illustrative purposes. Spring 2008 values represent data for May 2008, while figures for spring 2016 are for April 2016 (i.e. the latest available figures). The euro area (EA) value is calculated as a simple average of the values for the individual euro area economies.

Chart 1.17
Risks to government debt sustainability remain elevated in several euro area countries

Average interest rate-growth differential and cyclically adjusted primary balances for the period 2016-17 across the euro area

(percentages; percentage points of GDP; x-axis: average interest rate-growth differential, 2016-17; y-axis: average cyclically adjusted primary balance, 2016-17)



Sources: European Commission and ECB calculations.
Note: The size of the bubble represents the level of general government debt as at the end of 2015 as a percentage of GDP. EA stands for euro area.

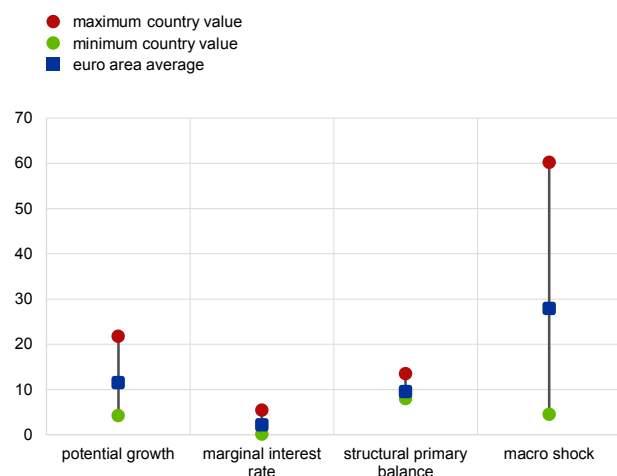
The outlook for government debt sustainability remains challenging despite some tentative signs of improvement. Having reached a peak at 94.4% of GDP in 2014, the aggregate euro area government debt-to-GDP ratio dropped – after seven years of consecutive increases – to 92.9% of GDP last year. The debt level has been projected by the European Commission in its spring 2016 forecast to continue falling gradually to 91.1% of GDP by 2017 thanks to lower interest payments and higher expected nominal growth following the adoption and subsequent expansion of the Eurosystem's public sector purchase programme. Still, the picture remains fairly heterogeneous at the country level, with some euro area countries still projected to see a further rise in their government debt ratios by 2017, including Finland, France, Greece and Luxembourg (albeit in the case of the latter from relatively low levels). That said, expected continued primary deficits and/or positive interest rate-growth differentials may complicate putting public debt levels on a sustainable downward path in other countries as well (see [Chart 1.17](#)). In the short term, the main

challenges to government debt sustainability across the euro area relate to insufficient structural and fiscal reforms, a prolonged period of low nominal growth, residual risks related to financial sector support and heightened political uncertainty in several countries in the context of upcoming elections, the refugee crisis and security concerns following recent terrorist attacks. In the medium to long run, these challenges are compounded by vulnerabilities related to lower potential GDP growth and population ageing-related costs. Simulation results suggest that a lasting shock of lower potential growth, higher government bond yields and worsening structural balances could put debt sustainability at risk (see [Chart 1.18](#)). In particular, a new macroeconomic shock may challenge the sustainability of public finances in a number of euro area countries.

Chart 1.18
Debt sustainability could be at risk in a number of countries in the event of further shocks

Reaction of the general government debt ratio to standardised macro and fiscal shocks

(percentage points of GDP)



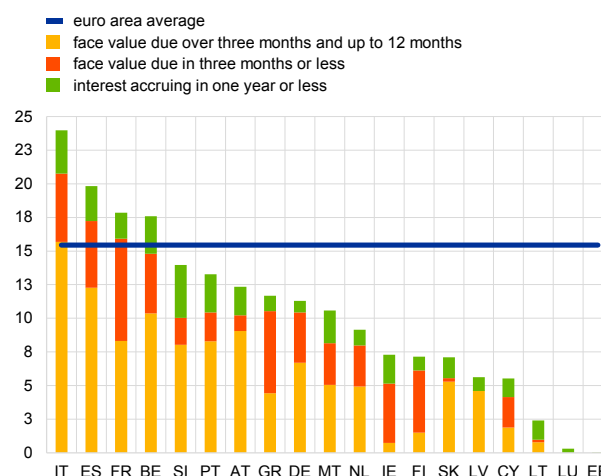
Source: ECB.

Notes: The chart shows the reaction of the euro area average general government debt ratio as of 2024 to standardised (1 percentage point) adverse shocks to potential growth, the marginal interest rate, the fiscal position (structural primary balance) and a country-specific combined macro shock as calibrated in the 2016 ESRB stress test. The shocks are permanent and are applied as of 2016. The deterministic debt simulations are conducted in a partial equilibrium framework, which takes into account feedback effects between fiscal, macro and financial variables.

Chart 1.19
Total government debt service needs remain high in several euro area countries

Principal and interest payments for the next 12 months by euro area governments

(Apr. 2016 – Mar. 2017; percentages of GDP)



Source: ECB.

Sovereign financing conditions have remained favourable in terms of both pricing and duration. Overall, the total debt service of euro area governments for the next 12 months is sizeable at around 16% of GDP, but is expected to decline going forward as lower interest rates translate into reduced debt servicing costs. Still, for some euro area countries the sovereign debt service needs are substantial at the current juncture (see [Chart 1.19](#)).³ However, financing concerns are currently mitigated by low sovereign funding costs for almost all sovereign rating categories (see [Chart 1.20](#)) and solid demand for government bonds against the backdrop of

³ The 2016 financing needs for Greece are relatively low due to the concessional terms of official loans.

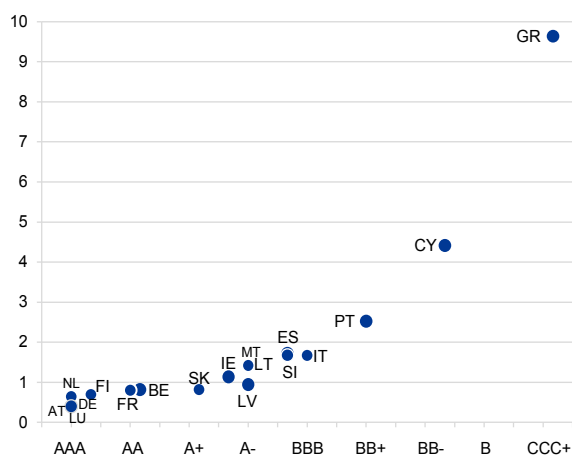
the Eurosystem's ongoing public sector purchase programme. That said, while alleviating fiscal costs, the currently record low sovereign yields may expose many euro area countries to sudden flow reversals, in particular if economic developments or reform efforts turn out to be less favourable than envisaged earlier. In terms of duration, the ongoing shift in issuance activity towards the long end of the maturity spectrum has continued in the current low-yield environment, with issuance activity particularly strong 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 6.6 years in the first quarter of 2016 amid marked 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.

Chart 1.20

Sovereign financing conditions remain favourable for most rating categories

Sovereign ratings and ten-year government bond yields in individual euro area countries

(2015; percentages)



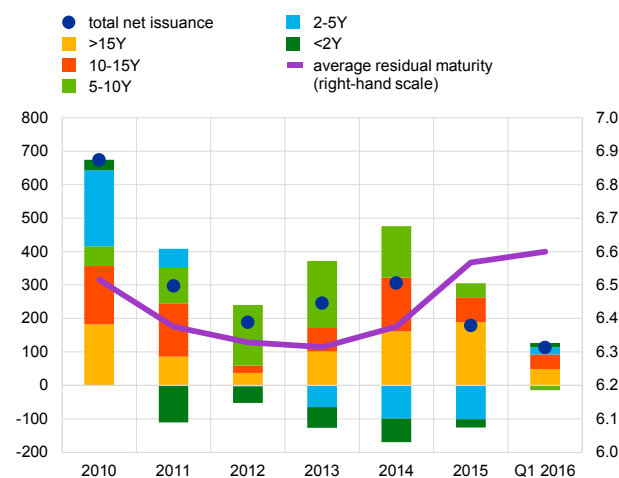
Sources: Moody's, Standard & Poor's, Fitch, ECB and ECB calculations.
Notes: The rating score represents the average rating by the three major rating agencies, Moody's, Standard & Poor's and Fitch. The bond yields indicate the average long-term interest rate for convergence purposes (secondary market yields of government bonds with maturities of ten, or close to ten, years) for the period from January 2015 to March 2016.

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 and average residual maturity of government debt securities in the euro area

(2010 – Q1 2016; EUR billions; years)



Source: ECB Government Finance Statistics.

Available financial assets may cushion sudden increases in sovereign financing needs. Financial assets held by euro area sovereigns are substantial, amounting to almost 40% of GDP as at year-end 2015, amid considerable cross-country heterogeneity. Similarly, the value of highly liquid assets (i.e. currency and deposits) that could be used to finance imminent rollover needs varies across countries, ranging from below 2% of GDP in the Netherlands to over 20% of GDP in Slovenia. Equity and investment fund shares/units account for the bulk of financial assets in most euro area countries, suggesting that the privatisation of state-owned

assets could play a role in alleviating debt sustainability concerns if those 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 and earnings position of the non-financial private sector has continued to improve, but remains weak.

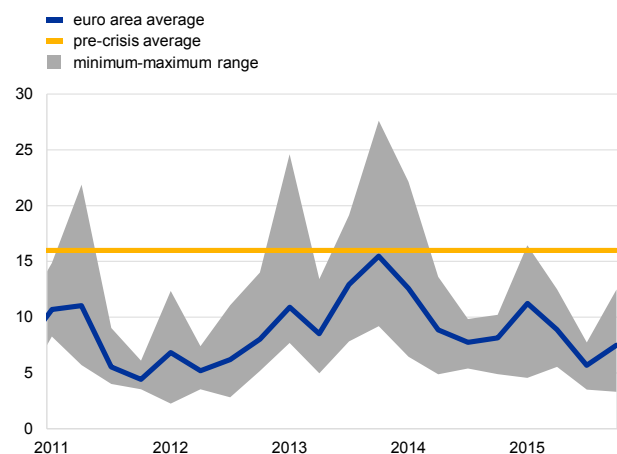
Disposable income growth of euro area households stabilised towards the end of 2015, while corporate profitability remained relatively subdued. The distance-to-distress indicator – combining balance sheet information with asset price volatility – suggests that overall credit risks related to household balance sheets in the euro area had declined somewhat towards the end of 2015 (see [Chart 1.22](#)). A very similar picture could be observed in terms of risks related to non-financial corporate balance sheets, mainly driven by lower financial market volatility observed in the final quarter of 2015 (see [Chart 1.23](#)). That said, the financial market turmoil earlier this year may suggest a potential rise in risk for the first quarter of 2016.

Chart 1.22

Risks related to euro area household balance sheets appear to have fallen somewhat at the end of 2015...

Households' distance to distress in the euro area

(Q1 2011 – Q4 2015; number of standard deviations from estimated default point)



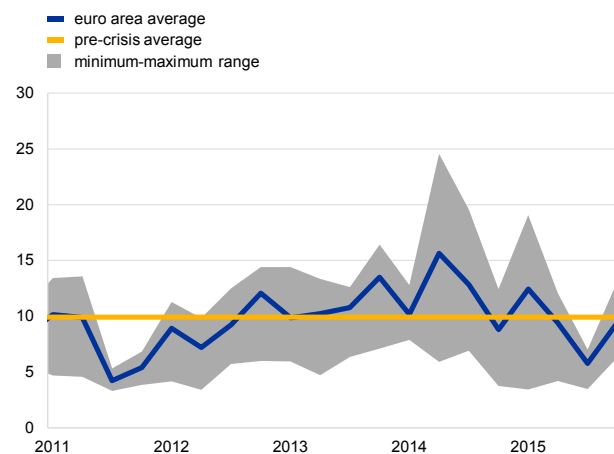
Sources: ECB, Bloomberg, Thomson Reuters Datastream and ECB calculations.
Notes: A lower reading for distance to distress indicates higher credit risk. The chart shows the average and the minimum-maximum range across 11 euro area countries for which historical time series cover more than one business cycle. For details of the indicator, see Box 7 in *Financial Stability Review*, ECB, December 2009. The pre-crisis average covers the period from June 1999 to June 2008.

Chart 1.23

... while corporate balance sheet risks have declined too amid lower financial market volatility

Non-financial firms' distance to distress in the euro area

(Q1 2011 – Q4 2015; number of standard deviations from estimated default point)



Sources: ECB, Bloomberg, Thomson Reuters Datastream and ECB calculations.
Notes: A lower reading for distance to distress indicates higher credit risk. The chart shows the average and the minimum-maximum range 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. The pre-crisis average covers the period from June 1999 to June 2008.

Income and earnings risks are expected to continue to diminish gradually. The euro area household sector is expected to recover further, buttressed by improving labour market conditions, even if the situation continues to be weak in some euro area countries, thereby still weighing on households' income prospects (see [Chart 1.24](#)). Also, observed improvements in household net worth on the back of gradually strengthening housing market dynamics across the euro area should help bolster

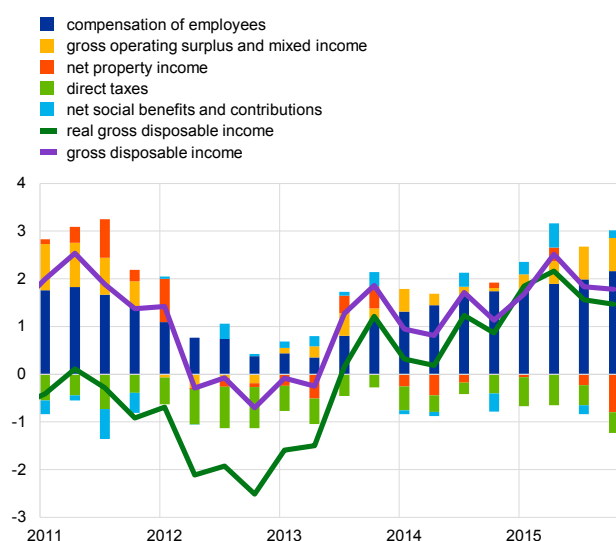
households' balance sheets and counterbalance the negative impact of the declines in the positive contributions of capital gains on financial asset holdings and net savings to household wealth since mid-2015. Similarly, in line with the ongoing gradual economic recovery, the number of corporate insolvencies continued to decrease in the euro area (see **Box 2**), even though it was still higher than prior to the global financial crisis, in particular in euro area countries most affected by the global financial crisis (see **Chart 1.25**). At the same time, despite tentative signs of improvement, corporate profitability has remained at rather low levels by historical standards, 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, profitability is expected to improve as the recovery gathers pace, thereby alleviating balance sheet pressures on vulnerable firms.

Chart 1.24

A gradually improving income position underpins households' debt servicing capabilities

Euro area households' gross disposable income

(Q1 2011 – Q4 2015; annual percentage changes; percentage point contributions)



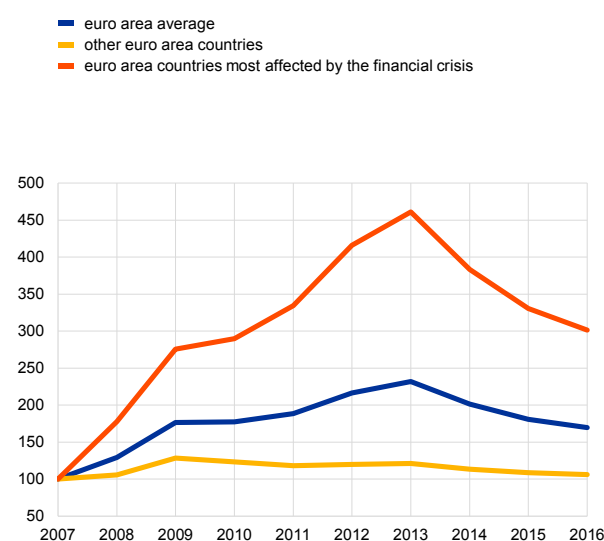
Sources: Eurostat and ECB.

Chart 1.25

The number of corporate insolvencies has declined since 2013, but is still above pre-crisis levels

Number of corporate insolvencies

(2007-16; index: 2007 = 100)



Sources: Euler Hermes and ECB calculations.
Notes: Euro area countries most affected by the financial crisis include Greece, Ireland, Italy, Portugal and Spain. Other euro area countries include Austria, Belgium, Estonia, Finland, France, Germany, Latvia, Lithuania, Luxembourg, Slovakia and the Netherlands. Cyprus, Malta and Slovenia are not included in the overall sample. Figures for 2015 and 2016 are forecasts.

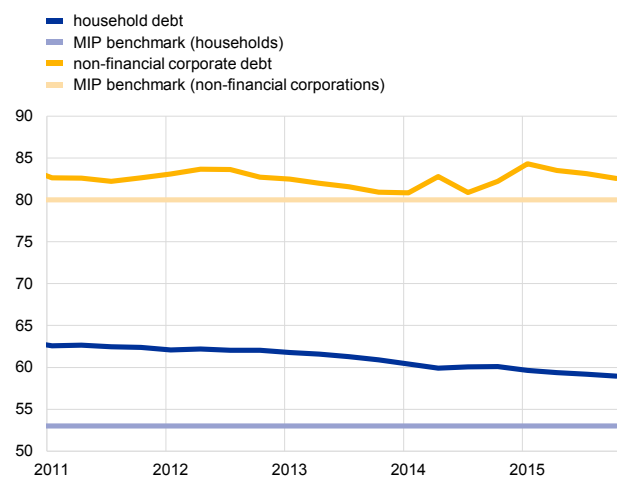
Legacy balance sheet concerns continue to constrain the non-financial private sector in the euro area. On average, euro area household indebtedness stood at 60% of GDP as at year-end 2015 (see **Chart 1.26**). Although not elevated by international standards, it remains high by historical standards. The level of non-financial corporate debt was more elevated at some 106% of GDP on an unconsolidated basis (excluding trade credit) or 83% of GDP on a fully consolidated basis, by both international and historical standards. Significant heterogeneity across countries underlies the aggregate euro area non-financial private sector debt figures, with Lithuania, Slovakia and Latvia at the lower end and Cyprus, Luxembourg and Ireland at the upper end of the country distribution.

Chart 1.26

Euro area household and non-financial corporate debt levels remain high by historical standards

Household and corporate debt levels in the euro area and related benchmarks

(Q1 2011 – Q4 2015; percentages of GDP)



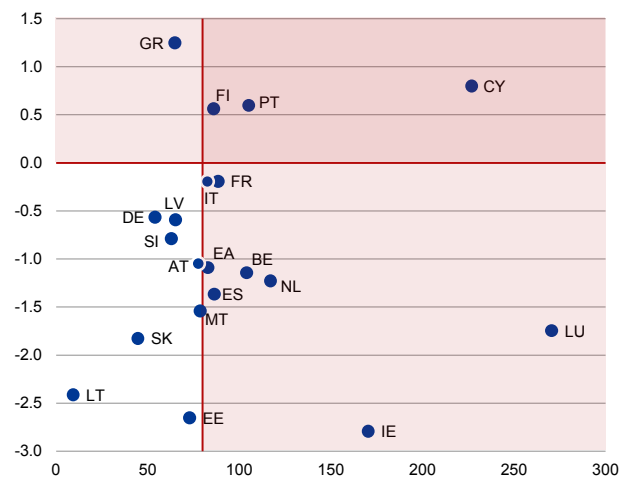
Sources: ECB and ECB calculations.
Notes: Non-financial corporate debt is fully consolidated, including debt securities, pension reserves as well as loans net of intra-sectoral loans. Consolidated household debt includes loans net of intra-sectoral loans and pension reserves. MIP refers to the European Commission's macroeconomic imbalance procedure, with a 133% of GDP limit for fully consolidated non-financial private sector debt split between firms and households based on their average past shares in the stock of non-financial private sector debt.

Chart 1.27

Corporate debt sustainability remains a challenge for some euro area countries

Consolidated corporate debt levels in the euro area and projected interest rate-growth differentials for the period 2016-20

(percentages of GDP; percentage points; x-axis: consolidated NFC debt-to-GDP ratio, Q4 2015; y-axis: projected interest rate-growth differential, 2016-20)



Sources: Eurostat, ECB and ECB calculations.
Notes: Non-financial corporate debt is fully consolidated, including debt securities, pension reserves as well as loans net of intra-sectoral loans. The red vertical line represents the MIP benchmark of 80% of GDP for consolidated non-financial corporate debt. MIP refers to the European Commission's macroeconomic imbalance procedure, with a 133% of GDP limit for fully consolidated non-financial private sector debt split between firms and households based on their average past shares in the stock of non-financial private sector debt. The interest rate-growth differential is defined as the effective borrowing cost for non-financial corporate debt minus nominal GDP growth. Consolidated non-financial corporate debt figures also 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). EA stands for euro area.

The high indebtedness of the non-financial private sector in some countries indicates further deleveraging needs. Balance sheet repair in the household and non-financial corporate sectors has been gradual at the aggregate euro area level, as a weak nominal growth environment and legal impediments in several countries tended to prevent a swift deleveraging in the non-financial private sector. Particularly in terms of corporate deleveraging, the pace of adjustment has differed markedly across the euro area to date, with deleveraging being more forceful in countries which had accumulated large amounts of debt prior to the crisis and have benefited from debt write-offs, in particular Ireland and Spain. In some euro area countries, continued high debt levels coupled with unfavourable interest rate-growth differentials still pose a challenge to corporate debt sustainability (see [Chart 1.27](#)), even if gradually improving corporate profitability in tandem with low interest payment burdens should support borrowers' debt servicing capabilities. From a more medium-term perspective, higher interest rates may imply further deleveraging needs going forward since a large part of corporate debt is at variable interest rates. That said, given concerns regarding the strength of the global economic recovery and the associated perceived scarcity of profitable fixed investment opportunities, elevated political uncertainty and the low opportunity cost of holding liquid assets, non-financial firms continue to hold historically high cash balances, which could

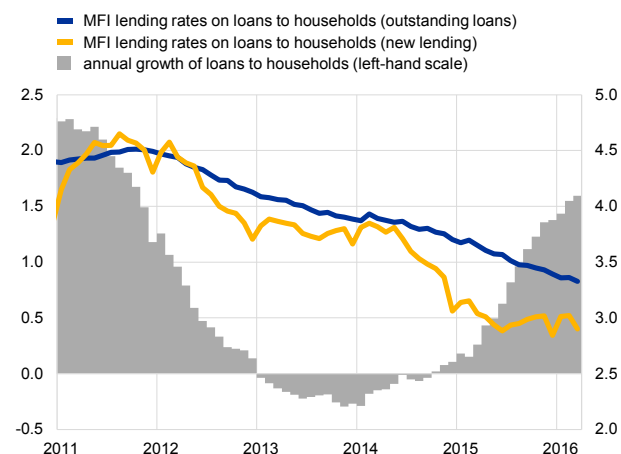
make an important contribution to reducing leverage or financing the economic recovery.

Chart 1.28

Bank lending to euro area households has shown signs of further recovery amid low lending rates

Annual growth in household loans and bank lending rates on new lending and outstanding loans to euro area households

(Jan. 2011 – Mar. 2016; annual percentage changes; percentages)



Source: ECB.

Note: Data have been adjusted for loan sales and securitisation.

Bank lending flows to the non-financial private sector remain muted, but continue to recover modestly amid low lending rates.

On average, bank lending to euro area households and non-financial corporations has continued to strengthen gradually (see [Chart 1.28](#) and [Chart 1.30](#)). The recovery in lending has been supported by record low interest rates across the maturity spectrum in almost all lending categories, as the transmission of monetary policy measures taken by the Eurosystem since June 2014 takes hold and banks progressively pass on the improvement in funding costs in the form of reduced bank lending rates. Nonetheless, the underlying overall loan dynamics have remained weak, mirroring possibly not only the fact that credit tends to lag the business cycle, but also remaining deleveraging needs as well as high liquidity buffers of non-financial corporations. The aggregate picture also masks diverging trends at the country level, with a continued contraction in credit to the non-financial private sector in countries most affected by the financial crisis, such as Ireland, Slovenia and Greece,

contrasting with more buoyant developments in other euro area countries such as Luxembourg, Slovakia and Lithuania. To further ease private sector credit conditions, in March 2016 the ECB announced a new set of targeted longer-term refinancing operations. These aim at reinforcing the ECB's accommodative monetary policy stance and strengthening the transmission of monetary policy by further incentivising bank lending to the real economy (except for loans to households for house purchase).

Favourable demand and supply-side conditions are underpinning the recovery of bank lending to the non-financial private sector.

The latest euro area bank lending survey of April 2016 suggests improving credit demand on the part of both households and non-financial corporations, irrespective of the loan purpose and firm size (see [Chart 1.29](#)). The low general level of interest rates remained a key contributing factor to increased demand across all loan categories. For loans to non-financial firms, financing needs for inventories and working capital as well as fixed investment and other financing needs have contributed to a continued increase in demand. As for housing and consumer loans, stronger demand for loans was also buttressed by continued favourable housing market prospects and financing needs for spending on durable goods, respectively. Supply-side constraints have eased for lending to enterprises and consumer credit, with increased competitive pressures remaining the main factor driving the easing in banks' credit standards. The net tightening of credit standards on loans to households for house purchase was largely driven by the implementation of the EU mortgage credit directive. Across firm sizes, credit standards were eased more strongly on loans to large firms than on loans to

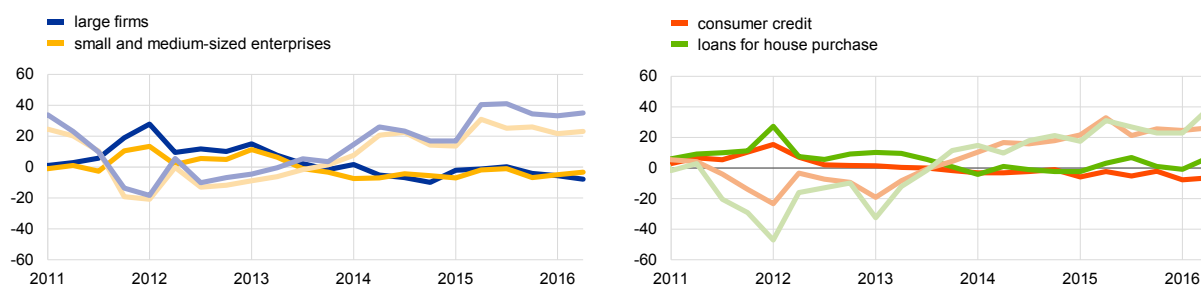
SMEs. Across maturities, banks eased their credit standards more strongly for short-term loans to enterprises than for long-term loans to enterprises.

Chart 1.29

Credit standards continued to ease amid continued loan demand

Credit standards and demand conditions in the non-financial corporate and household sectors

(Q1 2011 – Q2 2016; weighted net percentages; three-month expectations)



Source: ECB bank lending survey.

Notes: The bold lines denote credit standards, while the bright lines represent credit demand. Credit standards refer to the net percentage of banks contributing to a tightening of credit standards, while credit demand indicates the net percentage of banks reporting a positive contribution to demand.

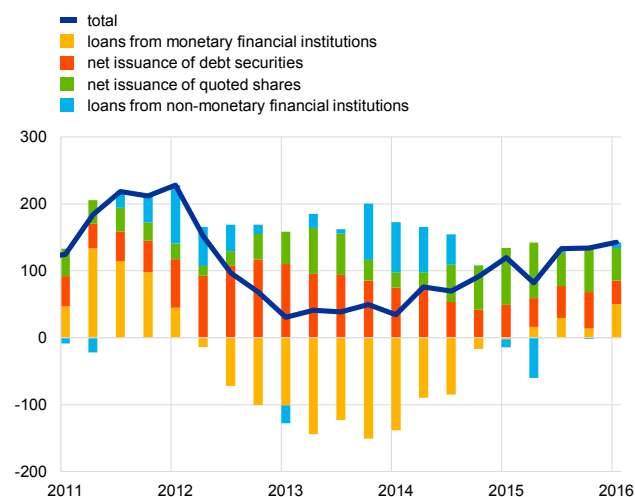
In addition to the gradual recovery in bank lending, euro area firms continued to benefit from benign conditions for financing from non-bank sources. Euro area non-financial firms' external financing from non-bank sources continued to increase in the second half of 2015 and the first quarter of 2016 (see [Chart 1.30](#)). This development was largely supported by continued low overall external funding costs. The net issuance of debt securities increased strongly in March 2016 owing mostly to specific factors following a contraction in January and February, eventually resulting in a positive outcome for the quarter as a whole (see [Chart 2.15](#)). In April and May issuance activity strengthened modestly, being supported inter alia by the ECB's policy package. At the same time, the ongoing strong growth in retained earnings (which reduces the need for external finance) and the recovery in bank lending have most likely dampened debt securities issuance in recent months. The net issuance of quoted shares has been weak in early 2016, while the cost of equity also picked up at the turn of 2015-16 (see [Chart 1.31](#)) amid unfolding corrections in euro area (and global) stock markets as a result of downward revisions to global growth prospects and expected corporate earnings, as well as uncertainty regarding the state of the Chinese economy and the associated financial stability risks.

Chart 1.30

External financing flows for euro area non-financial corporations have stabilised

External financing of euro area non-financial corporations

(Q1 2011 – Q1 2016; EUR billions; four-quarter moving flows)



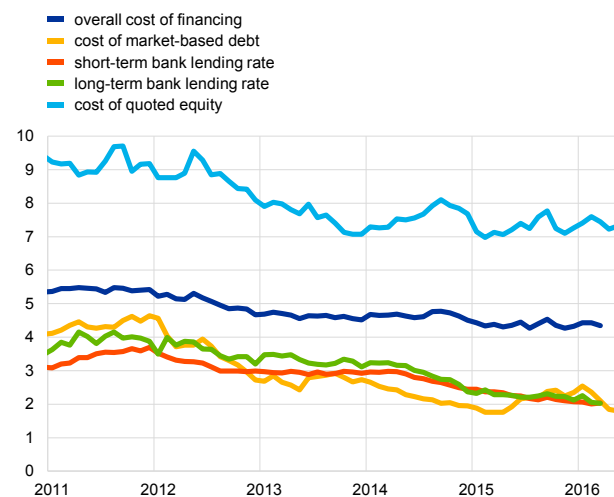
Sources: Eurostat, ECB, Dealogic and ECB calculations.
Note: Loans from monetary financial institutions to non-financial corporations are corrected for loan sales and securitisations, while loans from non-monetary financial institutions exclude loan securitisations.

Chart 1.31

Overall external funding costs of euro area non-financial firms remained low

Nominal cost of external financing of euro area non-financial corporations

(Jan. 2011 – May 2016; percentages)



Sources: ECB, Merrill Lynch, Thomson Reuters Datastream and ECB calculations.
Notes: The overall cost of financing for non-financial corporations 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.

While favourable financing conditions should contribute to a recovery in bank lending, several uncertainties remain.

The financing conditions of non-financial firms remain favourable and continue to support the financing of investment. Alongside improving supply and demand-side conditions, the ECB's credit easing measures, i.e. the targeted longer-term refinancing operations and the asset-backed securities and covered bond purchase programmes, should – together with other monetary policy measures taken – promote the recovery of bank credit, while also lowering funding costs for non-financial firms. However, elevated political uncertainty in the euro area, heightened stock market volatility and a further potential repricing in bond markets may constrain the recourse to market financing by firms and dampen the positive effects of very accommodative ECB policies on the cost of financing for and business investment of non-financial firms in the euro area.

Box 2

Euro area corporate default probabilities by sector of activity and firm size

Weak economic growth coupled with a high aggregate level of indebtedness has implied challenges for euro area non-financial corporations (NFCs) in recent years. Accounting for more than one-third of banks' total non-bank loan portfolio, the health of NFCs, in particular that of small and medium-sized enterprises (SMEs) which form the backbone of the euro area non-financial corporate sector, is crucial for the soundness of the euro area banking sector. The

riskiness of underlying non-financial corporate loan portfolios is not uniform though, as expected default frequencies⁴ (EDFs) strongly depend on the sector of activity and firm size.

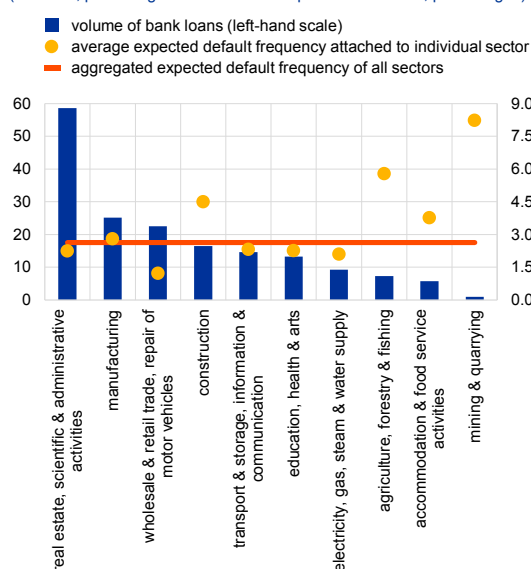
NFC sectors with high bank exposures appear to be less risky, and vice versa. In terms of the sector of activity of NFCs, euro area banks are currently mostly involved in lending to real estate (and related) activities, manufacturing and trade. These sectors of activity account for more than half of total loans to euro area NFCs and currently exhibit default probabilities at or slightly below the average based on data for listed companies from Moody's CreditEdge. By contrast, exposures to sectors of activity which are particularly dependent on commodity markets, overall property market developments and weather conditions (i.e. mining, construction and agriculture, respectively) rank among those with relatively high EDFs (see **Chart A**).

Chart A

Bank exposures and corresponding EDFs differ widely by sector of activity

EDFs of non-financial firms and respective bank exposures by NACE category

(Q4 2015; percentages of banks' total capital and reserves; percentages)



Sources: ESCB, Moody's CreditEdge and ECB calculations.

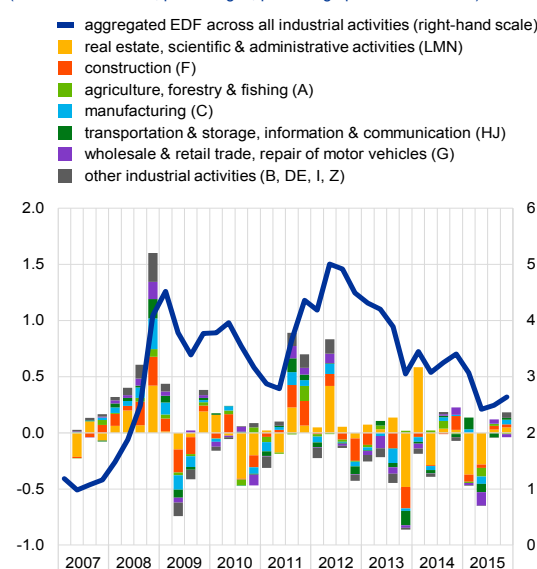
Notes: Loan volumes are ECB estimates based on national contributions. NACE categories reflect those used in the ESCB Balance Sheet Items (BSI) statistics and cover all NFCs. EDF measures are calculated based on granular data on EDFs within one year for listed companies in euro area countries except for Cyprus, Latvia, Lithuania and Malta. Aggregated EDF weighted by sectoral exposures.

Chart B

Aggregated EDFs are edging down, reaching levels last seen back in 2008

Aggregated EDF developments and contributions to change by sector of activity of NFCs

(Q1 2007 – Q4 2015; percentages; percentage point contributions)



Sources: ESCB, Moody's CreditEdge and ECB calculations.

Notes: EDF measures are calculated based on granular data on EDFs within one year for listed companies in euro area countries except for Cyprus, Latvia, Lithuania and Malta. Aggregated EDF weighted by sectoral exposures covering all NFCs. Letters in brackets represent the respective NACE categories. The category other industrial activities includes mining and quarrying (B), electricity, gas, steam and water supply (DE), accommodation and food service activities (I) as well as education, health and arts (Z).

The riskiness of bank lending to NFCs has overall fallen over the last year, but some sectors still appear to be vulnerable. After being broadly stable throughout 2014, the aggregated EDF of euro area NFCs (weighted by the corresponding sectoral bank exposures) started to fall in 2015, halving since its peak in mid-2012 and dropping to levels last seen in 2008 before the start of the global financial crisis (see **Chart B**). This development was underpinned not only by the ongoing

⁴ According to Moody's, expected default frequency is a measure of the default probability of a firm over a certain period of time (typically one year), with default being defined as a failure to make scheduled principal or interest payments.

economic recovery, but also by improving financing conditions for non-financial corporates in terms of both the availability and the cost of funding following measures taken by the Eurosystem. By this metric, most sectors appear to have become less vulnerable by the end of 2015, with exposures often decreasing when EDFs rose, or vice versa, suggesting that banks' overall loan book became somewhat less risky. However, the increase of the median EDF at the turn of 2015-16 in some sectors, such as construction, may indicate a slight pick-up in sectoral risks amid relatively high bank exposures to these sectors (see **Chart C**).

Beyond the sectoral aspects of lending, firm size is an important metric for riskiness too.

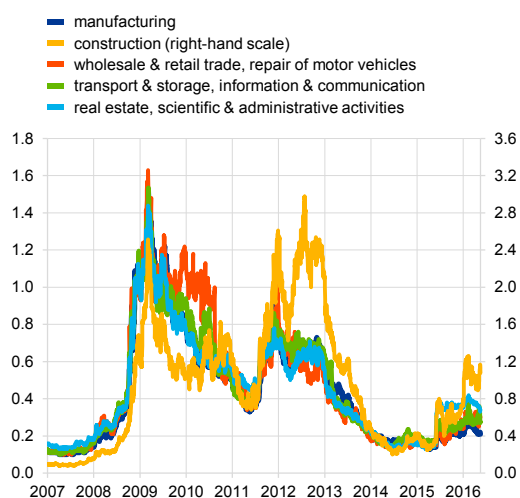
Interestingly, according to firm-level EDFs based on Moody's RiskCalc for non-listed companies, risks in relation to SMEs have fallen to a similar level to those for larger firms. Moreover, the breakdown of SMEs by firm size indicates that EDFs have fallen gradually over the course of 2015 irrespective of firm size (i.e. micro, small and medium-sized enterprises). At the same time, micro firms still have the highest EDFs across the majority of industrial activities. Moreover, SMEs active in cyclical sectors, such as construction or consumer goods production, have the highest EDFs (see **Chart D**).

Chart C

Some sectors appear to have become more vulnerable recently

Median of EDFs within selected sectors

(Jan. 2007 – May 2016; percentages)



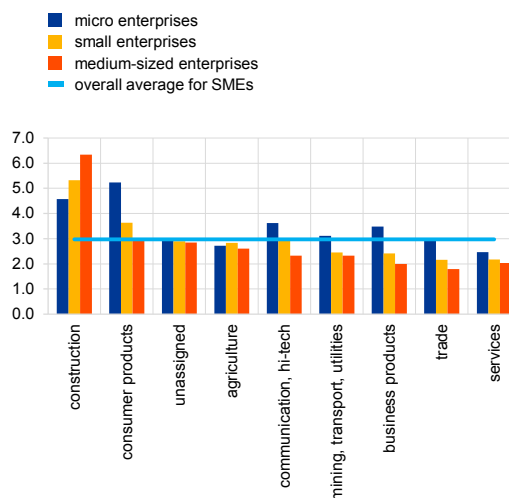
Sources: Moody's CreditEdge and ECB calculations.
 Note: Median calculated based on granular data on EDFs within one year for listed companies in euro area countries except for Cyprus, Latvia, Lithuania and Malta.

Chart D

EDFs for SMEs are overall the highest in construction and for micro firms

EDFs of SMEs by sector and size category

(Q4 2015; percentages)



Sources: Moody's RiskCalc, BvD Amadeus, BvD Daphne and ECB calculations.
 Notes: Based on the size of total assets, small and medium-sized enterprises were classified into micro firms (up to EUR 2 million), small firms (between EUR 2 and 10 million) and medium-sized firms (between EUR 10 and 43 million). Data are not available for Latvia and Lithuania. Average EDFs for SMEs are weighted by total assets.

All in all, with the economic recovery gaining traction, the risk metrics of euro area non-financial firms have tended to improve across sectors and firm sizes, but pockets of risk remain. The crisis has vividly illustrated the high cyclicality of the corporate sector which, together with a strong concentration of bank exposures in a few sectors, may suggest the need for close monitoring and – where warranted – the application of macroprudential instruments going forward.

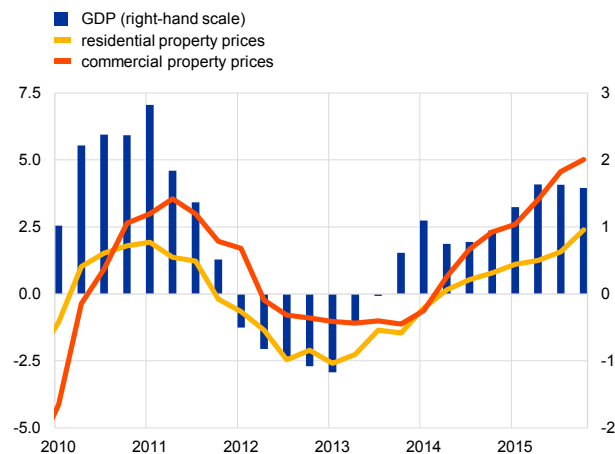
Growth in euro area property prices gathered further pace in 2015 from low levels amid decreasing heterogeneity at the country level. Having returned to a growth path in mid-2014, residential property markets have gained further momentum at the aggregate euro area level over the course of 2015, supported by low interest rates and the ongoing gradual economic recovery (see [Chart 1.32](#)). At the same time, euro area commercial property markets have continued to grow strongly and – in line with historical regularities – have tended to exhibit more pronounced cyclical dynamics than residential property markets. Overall, property price growth appears to have become less fragmented across countries, as the repercussions of major multi-year corrections in residential and commercial property markets in the aftermath of the global financial crisis have continued to dissipate at the country level. For residential property markets, this is reflected by the increasing positive contribution of the euro area countries most affected by the financial crisis to overall euro area house price growth (see [Chart 1.33](#)). Cross-country heterogeneity has declined further in commercial property markets as well amid signs of a firming recovery in a number of countries, including Ireland, which saw the most pronounced corrections in the euro area during the financial crisis.

Chart 1.32

Residential and commercial property markets continue to recover...

Commercial and residential property prices and GDP growth in the euro area

(Q1 2010 – Q4 2015; percentage changes per annum)



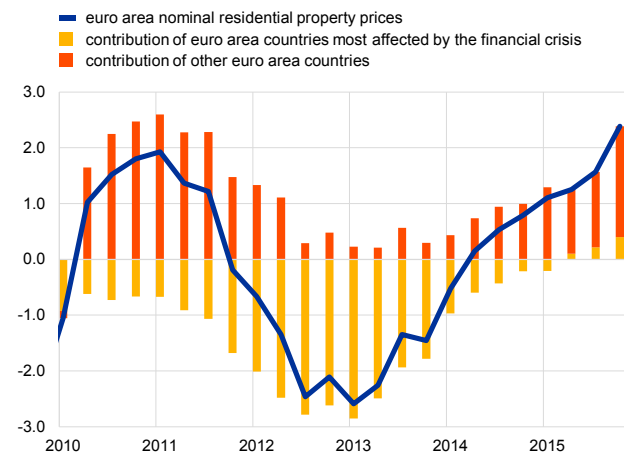
Sources: ECB and experimental ECB estimates based on MSCI and national data.

Chart 1.33

... with growth becoming more broad-based across countries

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

(Q1 2010 – Q4 2015; percentage changes per annum, percentage point contributions)



Source: ECB calculations based on national data.

Notes: The countries most affected by the financial crisis are Cyprus, Greece, Ireland, Italy, Portugal, Slovenia and Spain. The last observations were for Q4 2015 for all countries except Belgium, where it was for Q4 2014.

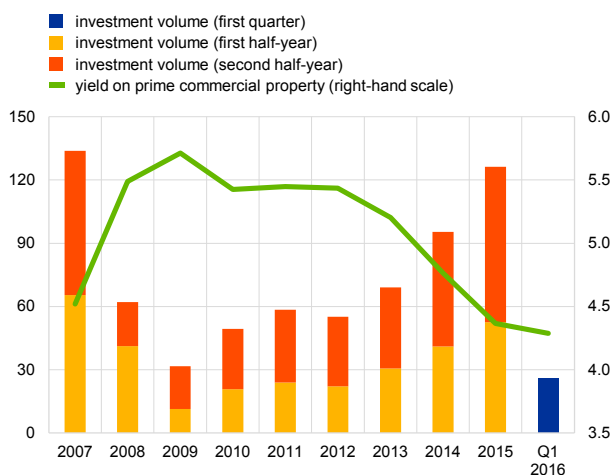
Fragmentation prevails also across regions and property types. Diminishing overall country-level fragmentation is nuanced by divergent regional price trends. Price developments in metropolitan areas have tended to outpace corresponding price movements at the national level in many countries, such as Austria and Germany, which may potentially ripple out to surrounding areas. At the same time, commercial property markets saw a marked bifurcation of price developments across 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.

Chart 1.34

Commercial property investment has remained strong, while yields have dropped further amid continued signs of a search for yield

Commercial property investment volumes and yields on prime commercial property in the euro area

(2007 – Q1 2016; EUR billions, percentages)



Sources: Cushman & Wakefield and Jones Lang Lasalle.

Notes: Based on legacy DTZ data. The euro area countries covered are Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain.

Correspondingly, investment activity in euro area commercial property markets has remained robust, with underlying 2015 transaction volumes almost on a par with the historical peak reached prior to the crisis in 2007 (see [Chart 1.34](#)). Germany, Italy and Portugal recorded the largest increases in investment volumes in 2015. Strong demand, mainly by non-European investors, has been accompanied by a continued decline in prime commercial property yields, which in several countries, such as Belgium, France, Germany, Portugal and Spain, already quote below pre-crisis levels. That said, continued 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.

While euro area residential property prices are currently broadly in line with fundamentals, prime commercial property valuation indicators appear to have moved farther away from their long-term average (see [Chart 1.35](#)). However, aggregate valuation estimates conceal highly heterogeneous developments at the country level (see [Chart 1.36](#)).

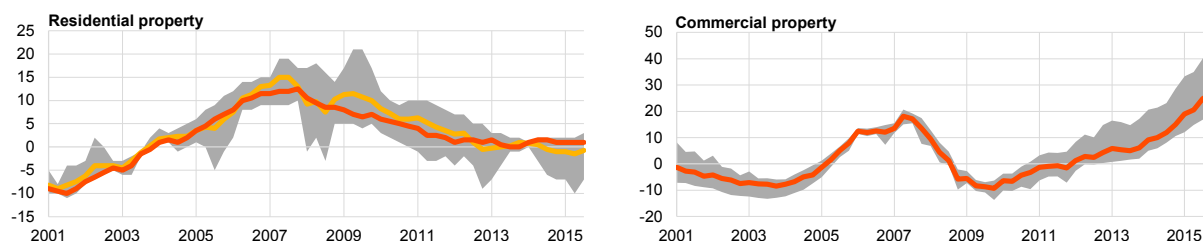
Relatively low valuations in both the residential and commercial property segments in countries with large post-crisis corrections, such as Ireland and Greece, contrast with estimated overvaluations in other countries like Belgium, Austria and Luxembourg. Developments at the country level also hide strong regional disparities, as suggested for example by the potential for overvaluation of residential property in some large cities in Austria and Germany. That said, while providing a consistent set of benchmarks across countries, these valuation estimates are also surrounded by a high degree of uncertainty and their national relevance is conditioned by country-level specificities, such as tax treatment or structural property market characteristics like tenure status. Similarly, 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 1.35

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

Valuation estimates of residential property prices at the euro area level

(Q1 2001 – Q4 2015; percentages; average valuations; minimum-maximum range across valuation estimates)



Sources: ECB and ECB calculations.

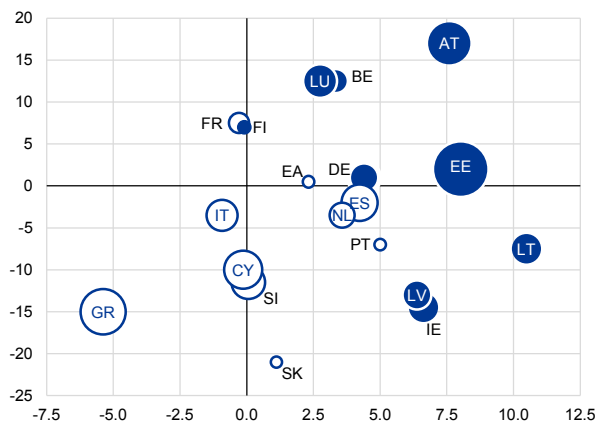
Notes: Valuation estimates for residential property prices are based on four different valuation methods: the price-to-rent ratio, price-to-income ratio and two model-based methods, i.e. an asset pricing model and a new model-based estimate (BVAR). For details of the methodology, see Box 3 in *Financial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

Chart 1.36

Aggregate euro area residential real estate valuation estimates conceal some cross-country divergence

Residential property price growth (x-axis) and valuations (y-axis)

(Q4 2015; annual percentage changes; percentages)



Source: ECB.

Notes: The size of the bubble represents the overall price growth between 2011 and 2015. Light bubbles indicate overall negative price growth, while dark bubbles refer to overall positive price growth. Average valuation is based on the price-to-income ratio and the new model-based estimate (BVAR). For details of the methodology, see Box 3 in *Financial Stability Review*, ECB, November 2015. Malta is excluded. EA stands for euro area.

All in all, the ongoing gradual recovery of euro area residential property markets is expected to gather further strength, with commercial property dynamics requiring monitoring. On the demand side,

the increased availability and lower cost of financing as well as rising affordability amid strengthening labour market conditions (in terms of both income and employment) are likely to underpin the ongoing recovery in euro area residential property markets going forward. Moreover, demographic factors related to the large influx of refugees in some countries should stimulate housing demand. At the same time, supply-side conditions are expected to improve further, in line with the gradual economic recovery, as indicated by rising confidence in the construction sector. In the same way, the increasing number of building permits (see [Chart 1.37](#)) should help mitigate upward price pressures. This outlook remains vulnerable to adverse economic shocks, which may endanger 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 affect the debt

servicing capacity of households and commercial property investors via a more limited availability and higher cost of funding, and may potentially represent a risk for banks in countries with high property-related exposures (see [Chart 1.38](#)). Price developments may need to be carefully monitored amid buoyant developments in some countries and property classes in the context of the current low-yield environment and the related ongoing search for yield. For residential property markets, a broader set of indicators which go beyond prices and valuations (e.g.

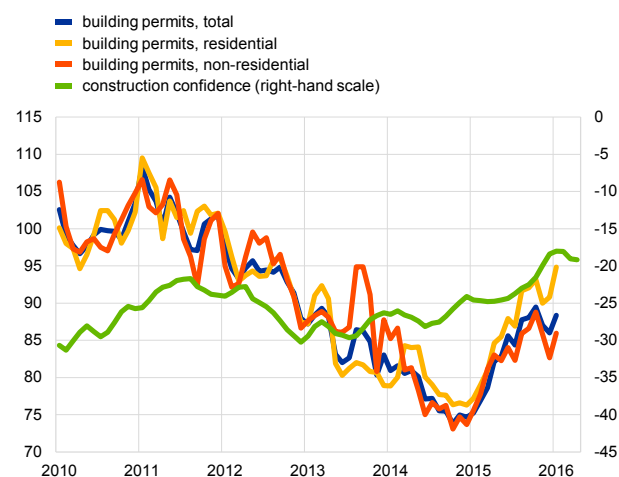
credit market developments, household indebtedness, banking sector exposures to property markets) may signal potential vulnerabilities in some countries. That said, the new macroprudential toolkit equips authorities to mitigate possible risks to financial stability at the country level in a targeted and granular way. Accordingly, several countries have already introduced measures to mitigate related risks.⁵ To the extent that real estate markets continue to gain momentum, further measures may be considered by national authorities. Given its macroprudential mandate, the ECB is also monitoring property market developments very closely.

Chart 1.37

Property market recovery is underpinned by rising confidence and activity in the construction sector...

Construction confidence and building permits in the euro area

(Jan. 2010 – Apr. 2016; index: 2010 = 100; percentage balances; three-month moving averages)



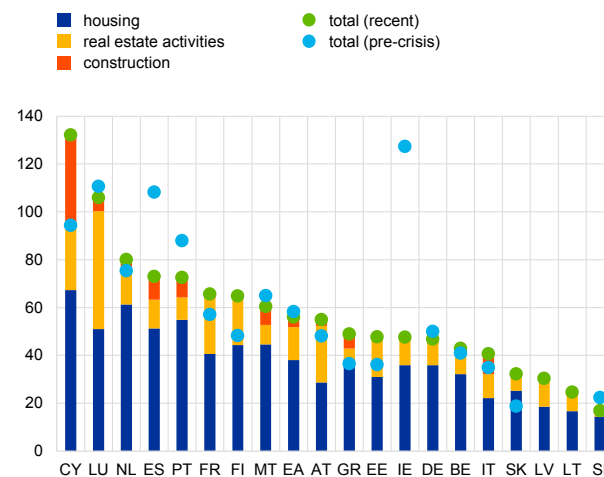
Source: European Commission.
Note: Building permits per square metre of useful floor area; these data are seasonally, but not working day-adjusted.

Chart 1.38

... but risks remain in countries with a banking sector with sizeable property-related exposures

MFI property-related lending exposures in the euro area

(Q2 2008; Q4 2015; percentages of GDP)



Sources: ECB and ECB calculations.
Notes: Property-related exposures comprise MFI lending to households for house purchase and to non-financial corporations for real estate activities and construction. Pre-crisis data are missing for Latvia and Lithuania. Data for lending for house purchase are not adjusted for loan sales and securitisation. Accordingly, in countries where securitisation is important (e.g. Belgium, the Netherlands and Ireland) exposure levels are higher. EA stands for euro area.

⁵ For further details, see Annex 1 in *Macroprudential Bulletin*, Issue 1/2016; ECB, March 2016.

2 Financial markets

Investor appetite has weakened as concerns have mounted about the resilience of global growth prospects amid waning emerging market prospects and persistently low oil prices. As a result, global financial markets continued to be marked by occasional – but short-lived – periods of elevated volatility, particularly in some of the riskier asset class segments. The persistence of such bouts of volatility in global asset prices has been tempered by considerable policy accommodation, in particular the ongoing monetary policy stimulus of major central banks (both conventional in the form of low policy rates and unconventional in the form of negative rates and/or asset purchase programmes).

Euro area financial market developments have in many ways mirrored global developments, but they have also reflected euro area sector-specific concerns. Euro area high-yield segments as well as bank equity and hybrid debt instruments were hard hit by corrections earlier this year. Some market segments, crucial for the functioning of the financial system, were however less affected. Euro area money and sovereign bond markets – both of which were influenced by ECB measures – remained broadly stable over the review period.

Overall, the euro area financial system has been relatively resilient to the reversal of global risk premia observed earlier this year, with indicators of systemic stress remaining low. Notwithstanding this broad resilience, certain euro area financial markets have been hit by short-lived periods of substantial losses and sharp intraday movements. These bouts of volatility have probably been amplified by the prevailing low secondary market liquidity during periods of market stress. The financial stability consequences of these periods of volatility clearly depend not only on their magnitude but also on their persistence. Any prospect of more long-lasting volatility amid an uncertain evolution of underlying macro fundamentals would further test the resilience of investors and the financial system, suggesting a need for sufficient buffers to withstand any more protracted reversals of asset price risk premia.

2.1 Increase in global asset price volatility amid emerging market concerns, changing policy expectations and low oil prices

Global financial markets have continued to be characterised by transitory spikes in volatility – with a particularly marked episode at the beginning of the year. These gyrations, particularly in some of the riskier asset class segments, appear to be related in part to changing expectations regarding fundamentals, resulting in a downward revision of global growth prospects (particularly in emerging market economies – EMEs), monetary stimulus in several advanced economies and bouts of higher risk aversion. In this environment, a reach for less risky assets has resulted in sovereign and investment-grade corporate bond yields remaining at low

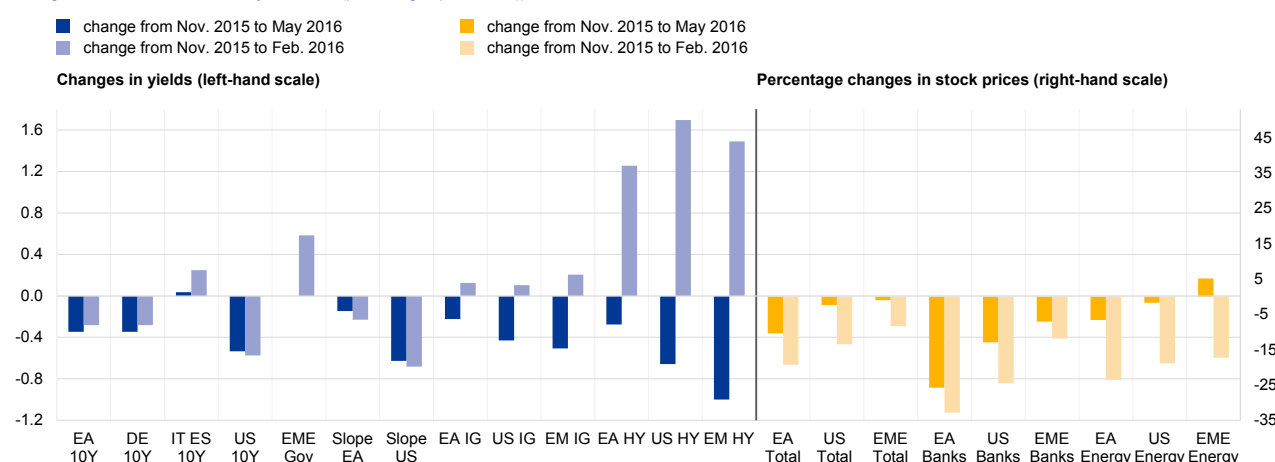
levels. By contrast, the more challenging macro outlook coupled with sector-specific concerns – particularly for the financial and energy sectors – have been detrimental to several risky asset classes, pushing their prices lower (see [Chart 2.1](#)).

Chart 2.1

Yields on safer assets remained low, while the prices of equities and high-yield corporate bonds fluctuated sharply amid a more challenging global growth outlook

Changes in global bond yields and stock prices since the November 2015 FSR

(developments from 25 Nov. 2015 until peak of turmoil (12 Feb. 2016) and until 13 May 2016; daily observations; left-hand scale relates to the blue bars (percentages per annum) and right-hand scale relates to the yellow bars (percentages per annum))



Sources: Bloomberg, Thomson Reuters Datastream and ECB calculations.
Note: EA stands for euro area, IG for investment grade and HY for high yield.

Concerns about the outlook for emerging markets, and that of China in particular, appear to be having a growing impact on asset prices globally.

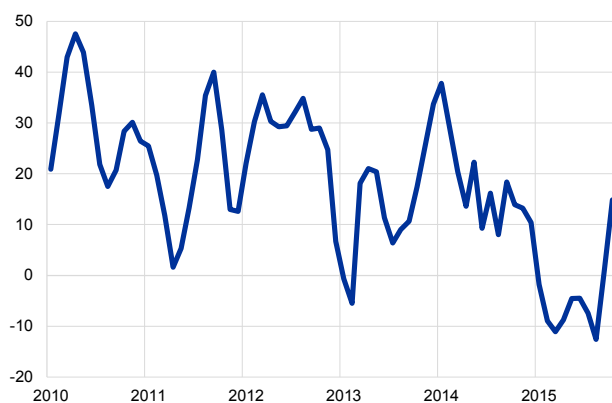
Throughout 2015 and in the first months of 2016 EME portfolio flows predominantly hovered in negative territory after several years of continued inflows (see [Chart 2.2](#)). Outflows from China have been particularly pronounced as exchange rate expectations changed and investors became increasingly concerned about the limits of policy in steering the economy smoothly to a sustainable growth path. Concerns relate to elevated credit growth, the prospect of rising non-performing loans, further house price increases and signs of elevated stock market valuations. Reflecting these broad macro and financial stability concerns, but triggered specifically by the depreciation of the Chinese yuan on 4 January, Chinese stock prices dropped sharply across the board at the beginning of 2016 (see [Chart 2.3](#)). Similar to previous corrections, notably in the summer of 2015, the fall in Chinese stock prices had a global impact. Looking ahead, a further easing of regulations concerning the leveraged buying of stocks could lead to heightened volatility in the Chinese equity markets.

Chart 2.2

Portfolio outflows from emerging markets in the second half of 2015 and early 2016

Net portfolio flows of stocks and bonds to/from emerging markets

(Jan. 2010 – Apr. 2016; monthly data; three-month moving average of portfolio purchases in USD billions)



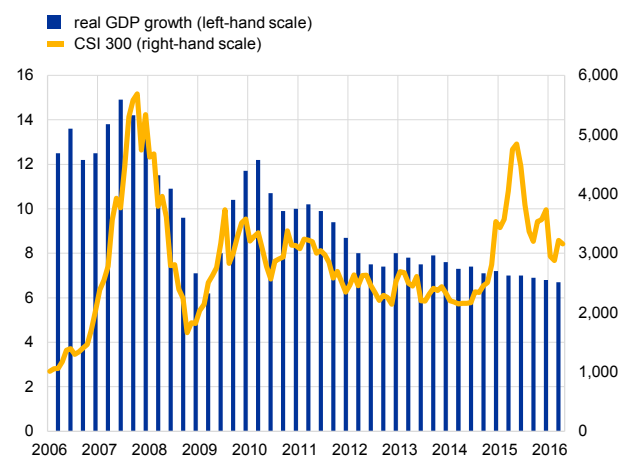
Source: Institute of International Finance.

Chart 2.3

No clear relationship recently between economic growth and stock prices in China

China's real GDP growth rates and the CSI 300 stock market index

(Q1 2006 – Q1 2016 (GDP) and Jan. 2006 – Apr. 2016 (stock prices); annual growth rates of GDP and index levels for stock prices)



Source: Bloomberg.

The near-term risk of higher global interest rates stemming from developments in the United States has receded as the global macro outlook has worsened.

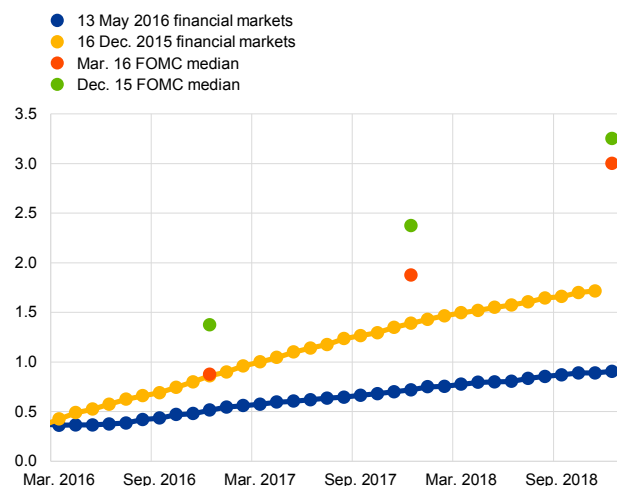
While the Federal Reserve tightened monetary policy at the end of last year, the expected pace of policy tightening has been revised down, partly on account of a more challenging external environment. This reassessment by the Federal Reserve contributed to a narrowing between the predictions for near-term policy rates by financial markets and those by the Federal Open Market Committee (FOMC) (see [Chart 2.4](#)). More aligned interest rate expectations reduce the risk of global asset price volatility stemming from monetary policy shocks in the United States. However, at longer horizons, policy rate divergence between financial markets and the FOMC has increased. This suggests that the risk of a sharp unexpected increase in US interest rates may have merely been pushed further into the future. Furthermore, should US interest rates nevertheless increase in the near term, the accommodative monetary policy stance in other major economies may dampen potential cross-country spillover effects. In contrast to earlier periods when US monetary policy was tightened, several other major central banks have eased monetary conditions further over the past six months (see [Chart 2.5](#)).

Chart 2.4

Both financial markets' and the Fed's interest rate predictions have been revised down

US federal funds rate forecasts by the FOMC and financial markets

(percentages per annum; forecasts for 2016, 2017 and 2018)



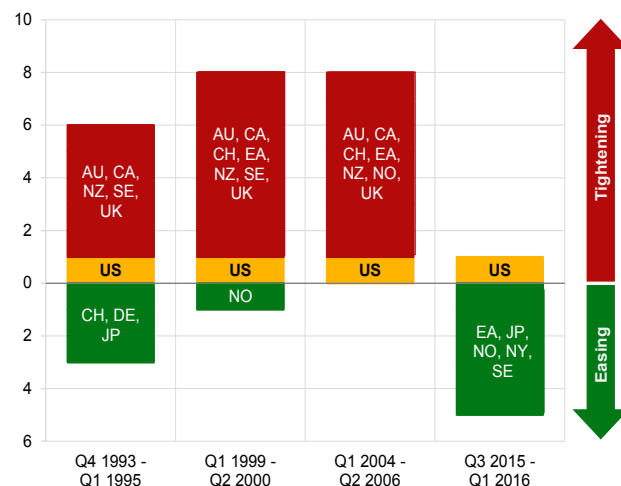
Source: Bloomberg.

Chart 2.5

Decoupling of monetary policy cycles in several advanced economies vis-à-vis the United States

US monetary policy tightening cycles and the respective policy stance in other advanced economies

(1993-2016; quarterly data; y-axis represents the number of countries)



Sources: Bloomberg and ECB calculations.

Notes: The chart identifies major Fed monetary policy tightening cycles since 1994. G10 central bank tightening (easing) of monetary policy is defined by an increase (decrease) of the main policy rate by more than 25 basis points over the Fed tightening cycle. Given the non-conventional measures adopted over recent years, the 25 basis point threshold is not applied to the most recent Fed monetary tightening cycle (Q4 2015 onwards). The Bundesbank's policy rates have been used as a proxy for the ECB's monetary policy before 1999. EA stands for euro area.

The factors depressing oil prices have pushed risk sentiment lower and influenced market-based inflation expectations in advanced economies.

Oil prices have been volatile and fallen sharply since the peak observed in mid-2014 when Brent crude oil hovered close to USD 115 per barrel. While the oil price decline is in principle a stimulus to economic growth in oil-importing economies, its drivers have shifted over time. While most of the early oil price decline in 2014 was explained by the strong rise in oil supply, supply and demand drivers have become less imbalanced, with weaker global demand conditions seemingly prevailing over recent quarters. The lower oil prices have led to a reassessment of credit risk and growth prospects, particularly for oil-exporting EMEs. Financial market developments in these economies have reflected these concerns, as seen from falling currencies and lower stock prices for oil-exporting economies vis-à-vis oil-importing economies (see [Chart 2.6](#)). The decoupling of correlations between riskier and safer global assets in relation to oil prices since the peak in oil prices in mid-2014 is also noteworthy. As oil prices began in 2015 to drop way below even the most bearish ex ante expectations, investors subsequently demanded a higher return on riskier assets (see [Chart 4](#) in the Overview). Oil price developments have also influenced specific market developments in advanced economies. In particular, market-based indicators of inflation expectations have been highly correlated with oil price movements since the peak in oil prices in mid-2014. This pattern reflects some concerns among investors not only that oil price movements increasingly reflect weak demand conditions, but also that inflation expectations may have become

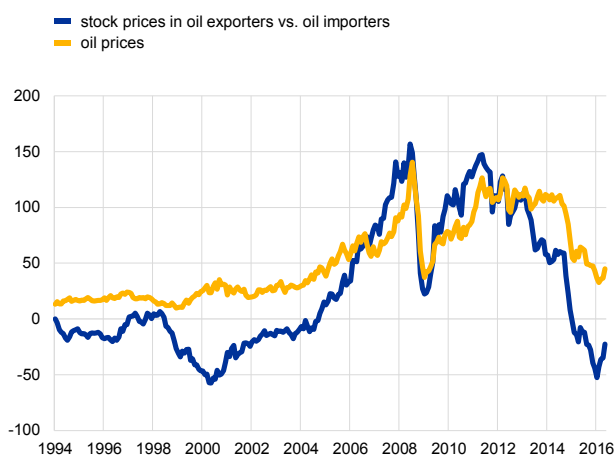
more adaptive and closely tied to persistently low inflation outcomes (see [Chart 2.7](#)). Clearly any prospects of a protracted period of deflation would be detrimental to financial stability.

Chart 2.6

Stock prices in oil-exporting economies relative to those in oil-importing economies

Stock price performance in oil-exporting economies relative to oil-importing economies and the level of oil prices

(Jan. 1994 – May 2016; monthly observations; relative cumulative stock market performance (%), indexed to 0 in Jan. 1994; Brent crude oil prices in USD)



Source: Thomson Reuters Datastream.

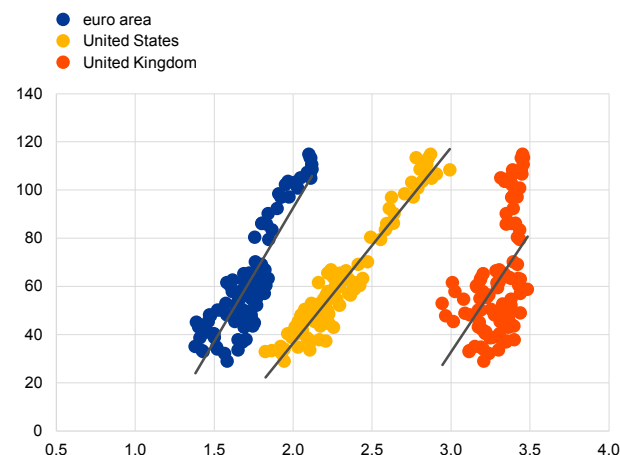
Notes: USD indices. Oil-exporting economies: Russia, Nigeria, Venezuela, Norway, Canada, Mexico, Colombia, the United Kingdom, Brazil and Indonesia. Oil-importing economies: the United States, China, Japan, India, South Korea, Germany, Singapore, Italy, France and the Netherlands.

Chart 2.7

Oil price developments gradually feeding into market-based long-term inflation expectations across major advanced economies

Five-year inflation swap rates in five years' time (x-axis) and Brent crude oil prices (y-axis)

(1 June 2014 – 13 May 2016; weekly data; percentages per annum; oil prices in USD)



Sources: Bloomberg and ECB calculations.

Note: Apart from measuring the "true" underlying long-term inflation expectations, market-based measures also contain an inflation risk premium. Thus, the close correlation may be due to time variation in both components.

2.2 Bouts of euro area financial market turbulence owing to the interplay of global factors and sector-specific challenges

The risks of an abrupt reversal of risk premia in financial markets highlighted in previous issues of the FSR partly materialised in early 2016. The higher

global financial stress due to the more challenging external environment was transmitted to the euro area and was amplified by sector-specific concerns within the euro area. The correction in euro area asset prices and the surge in volatility, while coinciding with broader developments in global markets, were uneven. Bank stocks and certain riskier debt instruments bore the brunt of the correction. Some segments, crucial for the functioning of the financial system, were however less affected. The euro area money market remained fully functional and sovereign bond yields were broadly stable during the height of the financial market turbulence in January and February. In the latter part of the review period, global market conditions improved gradually. In the euro area, ECB measures announced in March contributed to the improved market sentiment. In particular, the new longer-term lending arrangements

under TLTRO II calmed some market concerns that euro area banks' profitability would be adversely impacted by negative ECB deposit facility rates.⁶

Given the possibility of a further deterioration in the global growth outlook, the risk of further episodes of market turmoil remains high. Vulnerabilities outside the euro area have increased and have the potential to spill over to the euro area financial system. Furthermore, it cannot be ruled out that unexpected market events could trigger a further unwinding of positions not only in directly affected market segments but also more broadly amid changeable investor sentiment. If some of the vulnerabilities were to materialise, price corrections could be amplified by more fragile liquidity conditions.

Chart 2.8

Money market spreads were fairly stable at low levels over the past six months

Three-month EURIBOR/OIS spreads

(1 Jan. 2015 – 13 May 2016; weekly data; basis points)



Sources: Bloomberg, ECB, ICAP and STOXX.

Money market rates were insulated from the surrounding market volatility on account of abundant excess liquidity and the ECB's commitment that this would be maintained.

The turmoil in global financial markets had a relatively limited impact on the euro area money market. In fact, in the unsecured money market, the EURIBOR/OIS spreads remained fairly stable over the review period except for a slight increase in February (see [Chart 2.8](#)). The limited financial market contagion to the money market also reflects the regulatory efforts to reduce banks' reliance on short-term wholesale funding, the build-up of liquidity buffers against stress scenarios and improved capitalisations.

The turnover in the unsecured money market segment has fallen in recent quarters, accompanied by a reduction in the liquidity of short-term securities markets in the euro area.

The reduction in money market volumes mainly reflects the increased amount of excess reserves, which reduces the probability that any bank will need to borrow in the interbank market. Regulations have also played a role in reducing turnover in the money market segments. For example, the requirements for banks to maintain a more stable funding profile in relation to the composition of their assets have pushed issuance to maturities above one year. This in turn has contributed to a reduction in banks' issuance activities in the one-to-nine-month segment.

Secured markets have also been less active, predominantly owing to the ample liquidity and the low-rate environment. Similarly to the unsecured segment, volumes in secured markets remained low at the end of 2015 and the

⁶ In March 2016 the deposit facility rate was lowered by 10 basis points to -0.40% and the monthly purchases under the asset purchase programme were expanded to €80 billion per month (investment-grade euro-denominated bonds issued by non-bank corporations established in the euro area were added to the list of assets that were eligible for regular purchases). In addition, it was decided to launch a new series of four targeted longer-term refinancing operations (TLTRO II), starting in June 2016, each with a maturity of four years. For a full list of measures, see the [press release](#) following the 10 March 2016 Governing Council meeting.

beginning of 2016 (see [Chart 2.9](#)). Also in this segment, excess liquidity and the low-rate environment are contributing to lower activity. In addition, market participants mention that the forthcoming implementation of the leverage ratio (expected to impose a 3% capital charge on the non-risk-based balance sheet of banks) is making the secured business more costly. For that reason, some actors are leaving the repo business which is contributing to the reduction in volumes. In terms of pricing, interest rates on general collateral repurchasing agreements have continued to trend down in recent years as policy rates have fallen further. At the same time, the interest rate patterns on balance sheet reporting dates (year-end and quarter-end) have changed since 2015. In particular, owing to the excess liquidity in the system, the usual increase in borrowing rates on reporting dates has become much more muted (see [Chart 2.10](#)). Additionally, at the end of 2015 and the end of the first quarter of 2016, repo rates on German and French general collateral declined noticeably, while they rose on Italian and Spanish general collateral, suggesting an increased preference among financial institutions to hold highly rated collateral around reporting dates.

Chart 2.9
Secured money market volume has declined considerably

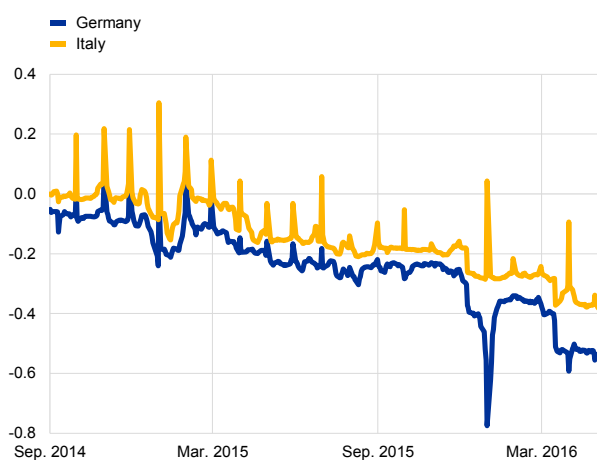
STOXX GC Pooling EUR Deferred Funding Rate Volume Index
(1 Sep. 2014 – 13 May 2016; daily data; EUR millions)



Sources: Bloomberg, ECB, ICAP and STOXX.
Note: The STOXX GC Pooling EUR Funding Rate Volume represents the total traded volume of all EUR overnight, tom/next and spot/next transactions in the GC Pooling ECB and ECB Extended baskets of the Eurex Repo GC Pooling market with the same settlement day.

Chart 2.10
Banks' higher cash holdings have impacted repo rates around balance sheet reporting dates

Repo rates for German/Italian general collateral
(1 Sep. 2014 – 13 May 2016; daily data; percentage points)



Sources: Bloomberg, ECB, ICAP and STOXX.

Euro area government bond yields continued to hover at low levels partly as a result of compressed term premia (see [Chart 2.11](#)). The low government bond yields in the euro area can partly be explained by the compressed term premia (see [Chart 2.12](#)). Model-based estimates suggest that euro area term premia became negative in January 2016 and thereafter fluctuated close to the previous lows observed before the sell-off in German government bond markets in April/May 2015. Low or even negative term premia are not just a euro area phenomenon. The term premia embedded in US government bond yields have fluctuated around similar levels in recent years. All in all, the prevailing low level of term premia in global

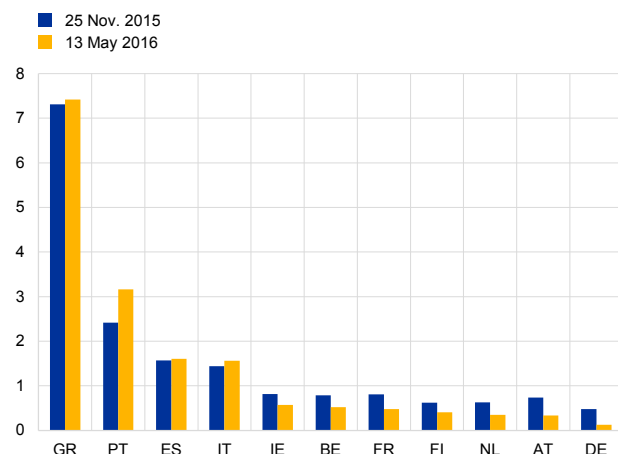
sovereign bond markets warrants close monitoring and investors should have sufficient buffers to withstand a reversal of this situation over the medium term.

Chart 2.11

Euro area sovereign bond yields have been stable overall at low levels since the November 2015 FSR...

Level of ten-year sovereign bond yields across selected euro area countries

(25 Nov. 2015 – 13 May 2016, percentages per annum)



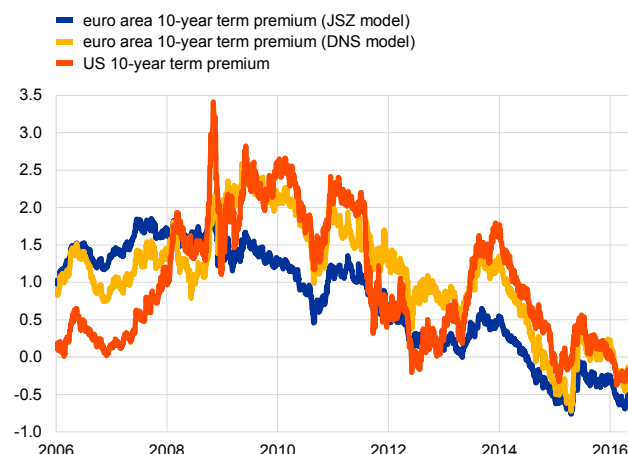
Source: Bloomberg.

Chart 2.12

... partly owing to compressed term premia

Term premia on US and euro area ten-year government bond yields

(1 Jan. 2006 – 13 May 2016; percentages per annum)



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 euro area DNS term premium is based on a rotated dynamic Nelson-Siegel model (see Nyholm, K., "A rotated Dynamic Nelson-Siegel model with macro-financial applications", *Working Paper Series*, No 1851, ECB, 2015). The US term premium is based on a regression approach (for more details, see Adrian, T., Crump, R. and Moench, E., "Pricing the term structure with linear regressions", *Journal of Financial Economics*, Vol. 110, No 1, 2013).

Euro area non-financial corporate bond spreads in the high-yield segment peaked in early 2016 as market sentiment deteriorated.

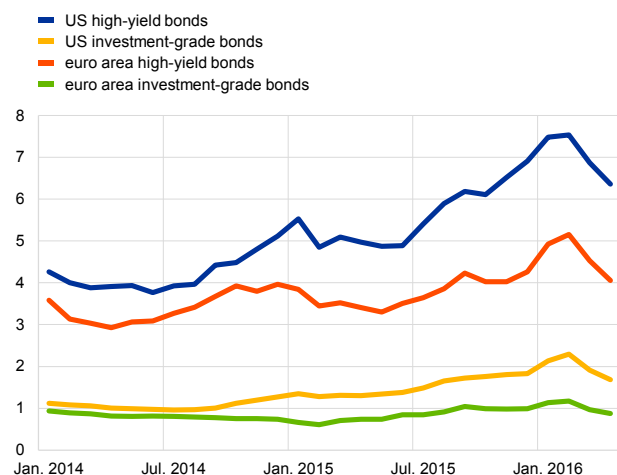
Corresponding spreads for investment-grade firms have remained broadly stable since the publication of the November FSR (see [Chart 2.13](#)). Bond spreads for lower-rated issuers and the energy sector increased sharply in the first months of the year as investors sold off riskier asset classes. The speed of upward adjustment was, however, more muted than that in similar US markets. In recent months, corporate bond spreads have narrowed as a result of the ECB measures announced in March (which included an expansion of its purchase programme to include euro-denominated bonds issued by non-bank corporations) coupled with better macroeconomic data. As at the end of April, the bond spreads for these sectors were broadly in line with model-based fair value (see [Chart 2.14](#)). As regards quantities, debt securities issuance hovered at low levels in January and February 2016, as firms halted planned issuance due to the high financial market volatility. Thereafter issuance increased as reduced global market volatility and ECB measures contributed to restoring market confidence and opened a window of opportunity to bring postponed issuance to the market (see [Chart 2.15](#)).

Chart 2.13

Bond spreads in the euro area below those in the United States

Selected US and euro area non-financial corporate bond spreads

(Jan. 2014 – Apr. 2016; monthly data; percentages per annum)



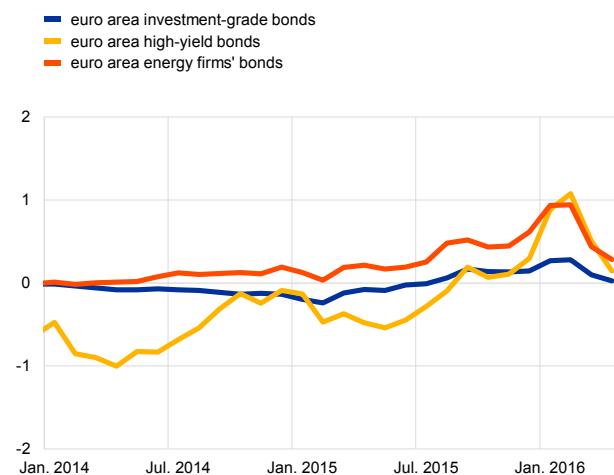
Sources: Bloomberg, Merrill Lynch and ECB calculations.

Chart 2.14

Euro area bond spreads broadly in line with fundamentals in April

Euro area non-financial corporations' excess bond premium

(Jan. 2014 – Apr. 2016; monthly data; percentages per annum)



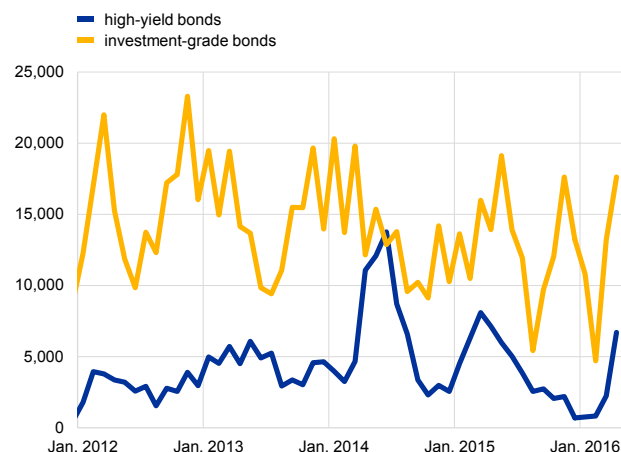
Source: De Santis, R. A., "Credit spreads, economic activity and fragmentation", Working Paper Series, ECB, forthcoming.
Notes: The excess bond premium is the difference between actual spreads and model-based implied spreads measuring credit risk at the individual bond level. An excess bond risk premium above/below zero suggests that corporate bond spreads are undervalued/overvalued vis-à-vis fundamentals.

Chart 2.15

Corporate bond issuance edged up in March and April

Gross issuance of euro area non-financial corporate bonds

(Jan. 2012 – Apr. 2016; monthly data; EUR millions; three-month moving averages)



Sources: Bloomberg and ECB calculations.

Financial and survey-based indicators continue to suggest more fragile secondary market liquidity conditions.

This Review has reported in previous issues that low secondary market liquidity in the euro area, particularly in the corporate bond markets, may amplify adverse developments during periods of stress.⁷ The low liquidity can thus be one factor explaining some of the sharp daily movements observed over the past year. Indeed, secondary market indicators for euro area sovereign bonds indicate low levels of market liquidity during the recent financial market turbulence between December 2015 and February 2016 (see [Chart 2.16](#), which compares a wide range of indicators that estimate different dimensions of market liquidity where values closer to the centre of the spider charts imply lower liquidity). Overall, sovereign bond market liquidity conditions during the bank turbulence earlier this year remained significantly above levels observed during the sovereign debt crisis, but more fragile compared with both the pre-crisis period and the period

⁷ For an overview of the asset purchase programme and differences in market liquidity, see *Financial integration in Europe*, ECB, April 2016, Box 2.

leading up to the introduction of the ECB's expanded asset purchase programme in March 2015. Liquidity conditions of vulnerable countries have been more adversely affected in the recent periods of market turmoil, particularly in the form of smaller deal sizes and lower turnover ratios, as well as higher bid-ask spreads and a greater price impact of trades. Low secondary market liquidity in the bond market is consistent with survey-based data. The March 2016 "Survey on credit terms and conditions in euro-denominated securities financing and over-the-counter derivatives markets" (SESFOD) suggests that the liquidity and functioning of some euro area sovereign and corporate bond markets deteriorated further in the first quarter of 2016.⁸ Furthermore, the results of the December 2015 SESFOD survey indicated a decrease in respondents' market-making activities in 2015, possibly reflecting the impact of changes in market microstructures on market liquidity. In particular, algorithmic and high-frequency trading may exacerbate volatility during stressed market conditions (see **Box 3**).

Chart 2.16

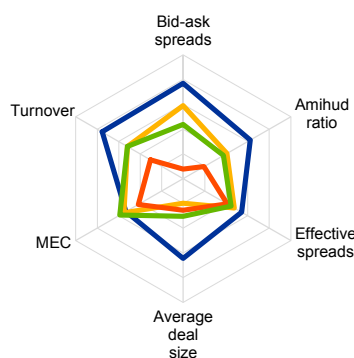
Financial and survey-based indicators suggest more fragile liquidity conditions in secondary markets

Euro area sovereign bond liquidity in euro area countries most affected by the financial crisis

(Jan. 2005 – Feb. 2016; average index value ranging from 0 (centre) to 1, where 1 = highly liquid)

- January 2005 to July 2007 (pre-crisis)
- August 2014 to March 2015 (Jackson Hole)
- May 2010 to July 2012 (sovereign crisis)
- December 2015 to February 2016 (bank turbulence)

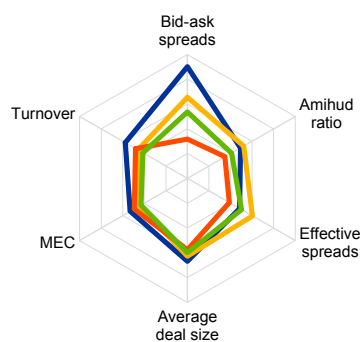
Euro area countries most affected by the financial crisis



Euro area sovereign bond liquidity in other euro area countries

(Jan. 2005 – Feb. 2016; average index value ranging from 0 (centre) to 1, where 1 = highly liquid)

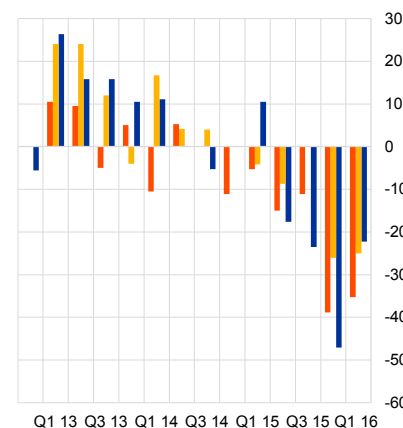
Other euro area countries



Changes in liquidity conditions from the SESFOD survey

(Q4 2012 – Q1 2016; net percentages of survey responses)

- government bonds
- investment grade
- high yield



Sources: MTS, iBoxx, Merrill Lynch, ECB and ECB calculations.

Notes: All liquidity indicators are normalised based on a cumulative distribution function for individual International Securities Identification Numbers (if granular data were available for the equivalent indicator; if not at a country level). Normalised indicators range from 0 to 1, where 1 indicates high liquidity. The indicators cover different liquidity dimensions: tightness (the cost of turning around a position over a short period of time), depth (the size of an order flow innovation required to change prices by a given amount) and resilience (the speed with which prices recover from a random, uninformative shock). Bid-ask spreads are an indicator for tightness; average deal size, effective spreads and the Amihud ratio are indicators for market depth (and breadth); and the market efficiency coefficient (MEC) is an indicator for resilience (deviations between long-term and short-term price volatility indicate deteriorating liquidity conditions). Turnover is an indicator for the volume of trading, which is not a liquidity dimension per se, but is often used as a complementary proxy for liquidity. For the right-hand chart, the net percentage is defined as the difference between the percentage of respondents reporting "increased somewhat" or "increased considerably" and that of those reporting "decreased somewhat" or "decreased considerably". Other euro area countries include Austria, Belgium, Finland, France, Germany and the Netherlands; euro area countries most affected by the financial crisis include Greece, Ireland, Italy, Portugal and Spain.

Euro area stock markets fell sharply around the turn of the year. In early January concerns about weakening economic activity around the globe (notably in emerging markets), compounded by potential adverse signals from falling commodity

⁸ The March 2016 SESFOD survey is available at: <https://www.ecb.europa.eu/press/pr/date/2016/html/pr160418.en.html>

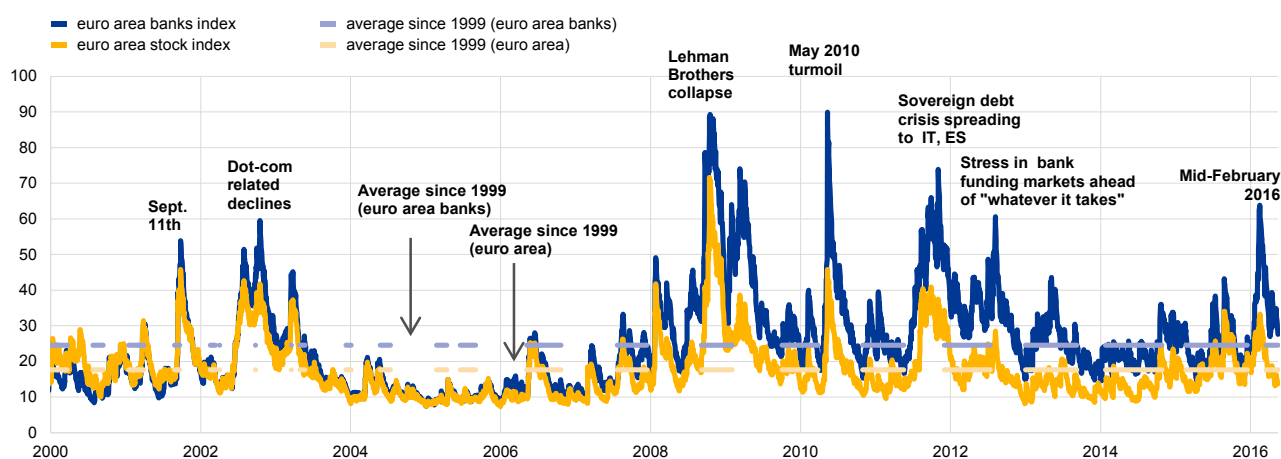
prices, dominated the stock markets. In addition, market participants became increasingly concerned about banks' ability to deliver sustainable profits in a low interest rate environment. Reflecting these sector-specific concerns, the prices of euro area bank stocks and of contingent convertible capital instruments fell sharply. Between the publication of the last FSR on 25 November and the trough recorded on 12 February, the EURO STOXX bank index lost around one-third of its value. The market turbulence was also vividly reflected in measures of stock market volatility. By mid-February the volatility of euro area bank stocks was similar to that seen during the stress observed in 2011-12, but was well below the peaks related to the Lehman Brothers collapse in 2008 and the May 2010 turbulence (see [Chart 2.17](#)).

Chart 2.17

High volatility observed in mid-February

Daily stock price volatility for the EURO STOXX index and the EURO STOXX bank index

(1 Jan. 2000 – 13 May 2016; daily observations; percentages per annum)



Sources: Thomson Reuters Datastream and ECB calculations.
Note: The volatilities have been computed using a GARCH (1,1) model.

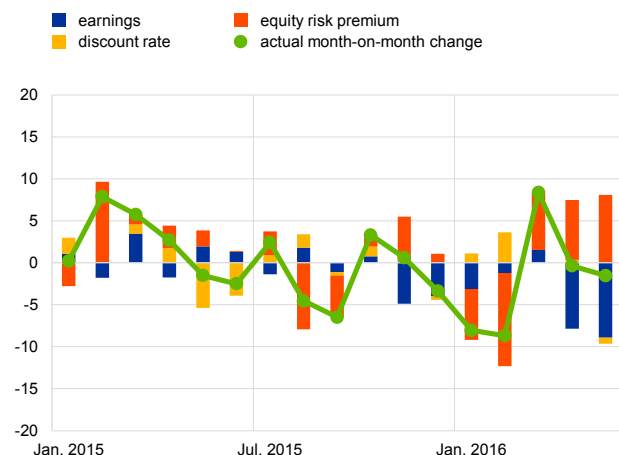
Model-based evidence suggests that the bulk of movements in euro area banks' stock prices in recent months can be explained by changes in investors' risk appetite. Looking at the determinants of banks' stock price movements from a dividend discount model viewpoint suggests that changing equity risk premia rather than earnings expectations made the largest contributions (see [Chart 2.18](#)). Some of the higher premia demanded in the first two months of 2016 have partly unwound since March. Notwithstanding the challenges facing the euro area banking system, this may provide some indications that the sheer speed and magnitude of the correction in euro area banks' stock prices earlier this year partly reflected an overreaction. Going forward, risk-neutral distributions for the EURO STOXX 50 index show that downside risks to future stock price movements have receded in recent months, but remain somewhat higher than six months ago (see [Chart 2.19](#)).

Chart 2.18

Higher equity risk premia were the main driver of the lower bank stock prices early this year

Contributions to changes in euro area bank stock prices

(Jan. 2015 – Apr. 2016; percentage points)



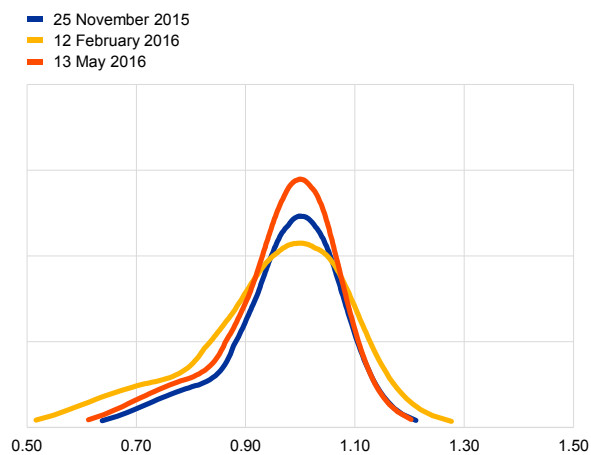
Sources: Thomson Reuters Datastream and ECB calculations.
Notes: Contributions to monthly changes in stock price changes are estimated using a three-stage dividend discount model. A higher equity risk premium is displayed with negative values in the chart since it lowers stock prices.

Chart 2.19

Downside risks to euro area stock prices have receded in recent months

Risk-neutral distributions derived from options on the EURO STOXX 50 index

(25 Nov. 2015, 12 Feb. 2016 and 13 May 2016)



Sources: Thomson Reuters Datastream and ECB calculations.
Note: The y-axis shows the density of three-month constant maturity options on the Dow Jones EURO STOXX 50 index. On the x-axis, this index is normalised by rebasing it to 1 at the maximum of the probability density function, which – under normal circumstances – is near the closing level of the index for the day.

Box 3

Financial stability implications of structural changes in market microstructures – algorithmic and high-frequency trading

The use of algorithms to execute trades in financial markets has grown considerably in the last decades, amid technological advancements in computing power and the speed of processing information. Among the wide range of algorithmic trading strategies, high-frequency trading (HFT) has received perhaps the most attention given its potential for major market disruptions such as the “flash crashes” that have occurred in recent years. Gauging the financial stability implications of HFT strategies is complex given that different strategies may create very heterogeneous externalities (both positive and negative) for other market participants unable to process such high-frequency information. Such externalities give rise to financial stability risks encompassing liquidity, procyclicality, confidence in the face of prospective opacity, and market resilience.

HFT activity has tended to migrate towards electronic trading platforms and standardised products, the structured nature of which is a precondition for high-frequency algorithmic trading. The characteristics of the global foreign exchange market, the US Treasury market as well as certain equity and commodity futures markets meet these requirements, which has resulted in a high presence of HFT in those markets. In 2010 the TABB Group estimated that HFT represents 56% of trading volumes in US equity markets, 38% in European equity markets and in the range of 10-30% in Asia-Pacific equity markets. For FX markets, according to the BIS (2011), HFT amounted to 24-30% of spot market turnover. The BIS (2016) estimates that more than 50% of trading volume in benchmark US Treasury bonds can be associated with HFT. European bond

markets are, however, believed to be less exposed to HFT because the use of request-for-quote protocols that query for executable prices quoted to multiple counterparties simultaneously (rather than the use of central limit order books that match bid and ask orders in real time), manual processes, and a low degree of standardisation, as seen in euro area corporate and government bond markets, limit HFT trading strategies. In the euro area bond futures markets, which are more important for price discovery in the cash bond market than in the United States or Japan, HFT is however increasing in volume.

Four key issues from a financial stability perspective should be highlighted. A first risk relates to the implications for market liquidity and the presence of liquidity providers during stressed market conditions in particular. The impact of HFT on market liquidity and volatility is subject to controversy. Some studies cite benefits associated with HFT in terms of lowering transaction costs, helping price discovery, improving secondary market liquidity, and providing more diversity of market participants. Others argue that gains from HFT are only reaped by HFT participants themselves with limited societal benefits, and that HFT may exacerbate volatility in stressed market conditions.⁹ While the presence of HFT on top of central limit order books may improve liquidity for small transaction sizes, it can create the illusion of ample liquidity that disappears when transaction sizes become larger.

A second implication for financial stability is that a large presence of non-human trading may increase the “self-reflexivity of markets”, i.e. price changes are increasingly driven by prices themselves. To date, it is unclear what the implications of strategic behaviours among fast-adapting machines are, as in most cases these are agnostic to underlying fundamentals. A key question in this respect relates to the availability and effectiveness of, for example, circuit breakers in the event that the machine-led price discovery runs off track very quickly.

Third, the crowding-out of traditional committed market-makers is a concern from a financial stability perspective as their presence is needed in particular during adverse market conditions. Trust and confidence in the integrity of financial markets are key to ensure that markets can perform their fundamental role of matching suppliers and users of capital, hence efficiently allocating capital. Events such as “flash crashes”, the risk of fraudulent behaviour, adverse selection stemming from the competitive advantage of extremely low response times, concerns over the depth of central limit order books and the enforceability of observed prices may undermine that trust. More precisely, the perception of an uneven playing field may crowd out traditional market-makers and incentivise them to migrate their activities from “lit” markets to “dark” trading venues that function at a lower frequency.

A final implication for both financial stability and the prudential supervision of markets concerns the ability of infrastructures to cope with the surging speed of messaging and trading. Significant, albeit short-lived, price moves even on very liquid markets¹⁰ have highlighted the need for circuit breakers. The challenge for prudential supervision of markets relates to the large portion of orders being cancelled quickly and illegal market practices occurring too quickly for supervisors to detect them. While many of the perceived negative implications of HFT are already

⁹ See Chung, K. and Lee, A. (forthcoming) for a review of the literature on the impact of HFT and regulatory initiatives around the world.

¹⁰ Examples are the US equity markets (e.g. the August 2015 1,000 point drop in S&P futures) and the US Treasury markets (e.g. the October 2014 “flash crash”). See Bouveret, S. and Lemaître, M., “Characterizing conflicts in fair division of indivisible goods using a scale of criteria”, *Autonomous Agents and Multi-Agent Systems*, Vol. 30(2), 2015, pp. 259-290.

addressed by existing regulation, notably rules against market manipulation, some HFT trading strategies are however designed specifically to obscure their actual trading intent.

Amid this rapidly changing landscape, regulatory discussions around the world have focused on four main approaches to address the risks described above, which are already partially covered by the upcoming MiFID (Markets in Financial Instruments Directive) II rules.¹¹ First, minimum transparency requirements for all market-makers and trading risk controls, which will also involve a pre-trading test phase for algorithms, primarily intend to reinforce market integrity. Second, taxation and trading fee regimes intend to limit procyclicality, shore up market liquidity and enhance market integrity. Third, technical limitations on trading platforms, such as harmonised tick-size regimes, aim to strengthen market resilience. Finally, requirements to register on trading platforms and the imposition of market-making obligations and other trading commitments based on traders' activity levels will require large traders to maintain liquidity even under stressed market conditions and therefore help dampen market cyclicality. In addition, "soft regulation", such as establishing codes of conduct, is also considered by both the industry and policymakers to improve market integrity (see for instance the development by the BIS Foreign Exchange Working Group of a single code of conduct for the foreign exchange market). While single measures may not suffice to contain specific risks arising from (high-frequency) algorithmic trading given its complex nature, the collective set of measures taken together should enhance monitoring and oversight of high-frequency algorithmic trading – to the benefit of financial stability.

¹¹ See the 2015 ESMA draft Regulatory Technical Standard on MiFID II/MiFIR. See also Directive 2014/65/EU, Article 4(1)(39) and (40) and Articles 17(1) to 19(4).

3 Euro area financial institutions

The bout of global market turbulence in early 2016 had strong impacts in bank equity markets and in certain segments of the bank credit markets. This market turmoil notwithstanding, systemic stress specific to the euro area financial sector has remained contained, also reflecting the significant progress that euro area financial institutions have made in strengthening their fundamentals over the past few years. This resilience notwithstanding, this episode of market turmoil highlighted the challenges the financial sector is still facing years after the heights of the crisis which, if unresolved, could lead to a re-emergence of localised or more generalised stresses in the system and constrain its capacity to support the economic recovery.

In general, profitability prospects remain muted in a low nominal growth and interest rate environment. A key cyclical challenge for bank profitability is linked to the subdued outlook for bank revenues stemming from the combination of still muted loan demand and the prospect of margin compression. Among the more structural challenges, the large stock of legacy problem assets in some euro area countries continues to dampen banks' profitability and weigh on their capacity to extend new loans. In addition, structural challenges to bank profitability could also arise from overcapacity in some euro area banking sectors

A low-growth and low-yield environment also poses challenges for the insurance sector, and for life insurers in particular, as it dampens insurers' profitability and possibly erodes capital positions in the medium term. In this environment, insurers continue shifting their asset allocation towards more illiquid assets and higher-yielding (but lower-quality) investments to boost returns.

Growth in the non-bank financial sector has slowed as the rapid expansion in the investment fund sector stalled amid a decline in asset prices and a partial reversal of net flows. In this context, concerns have surfaced that substantial divestments by funds can amplify market-wide shocks, especially if liquidity conditions in secondary markets are weak. Increased risk-taking over the past years also implies heightened sensitivity to a prospective simultaneous reversal in risk premia and fund flows.

Scenario analysis suggests that a materialisation of key risks to financial stability could have significant implications for banks and insurers alike in the euro area. At the same time, a complete assessment of financial stability risks remains hampered by a dearth of harmonised reporting outside these regulated sectors.

On the policy front, the regulatory overhaul of the banking sector is nearing completion as the outstanding elements of the Basel III framework related to the calibration of the leverage ratio and the reduction in the variability in risk-weighted assets are about to be finalised. At the same time, progress continued apace in macroprudential policy implementation, with a range of measures introduced by euro area countries over the last six months.

3.1 Balance sheet repair continues, but challenges from low profitability and high legacy non-performing assets remain

3.1.1 Banks face significant profitability challenges, stemming from both cyclical and structural factors¹²

Market sentiment about the prospects for the euro area banking sector deteriorated in early 2016, mirroring developments in other major regions. This largely reflected investors' increasing concerns about banks' ability to generate sustainable profits in a low interest rate environment. While euro area banks' financial performance moderately improved in 2015 compared with the previous year, banks face significant challenges to their profitability stemming from both cyclical and structural factors. Among the cyclical factors, the current subdued economic growth outlook and – by extension – the low interest rate and flat yield curve environment remain a key challenge for euro area banks' profitability. In addition, the large stock of unresolved non-performing assets in some parts of the euro area is also dampening profitability prospects and continues to weigh on banks' ability to extend new loans. Finally, structural challenges to profitability could also stem from overcapacity in some banking sectors.

Market sentiment about the prospects for the banking sector worsened at the turn of the year

A marked (but short-lived) deterioration in market sentiment towards the banking sector took place at the start of the year (see Chart 3.1). Rising risk aversion across global financial markets hit euro area banks' share prices particularly hard, as they fell close to previous lows in 2012. Certain segments of the bank credit markets, in particular that for contingent convertible bonds (CoCos), were also significantly affected. Euro area bank shares have recovered some of the losses since the trough in mid-February, although they have still underperformed UK and US peers since last December.

The substantial decline in bank equity prices largely reflected a re-evaluation of banks' profitability prospects in a low growth and interest rate environment.

This interacted with existing concerns about asset quality in parts of the banking sector owing to the unresolved legacy non-performing assets as well as with credit quality concerns relating to emerging market and commodity sector-related

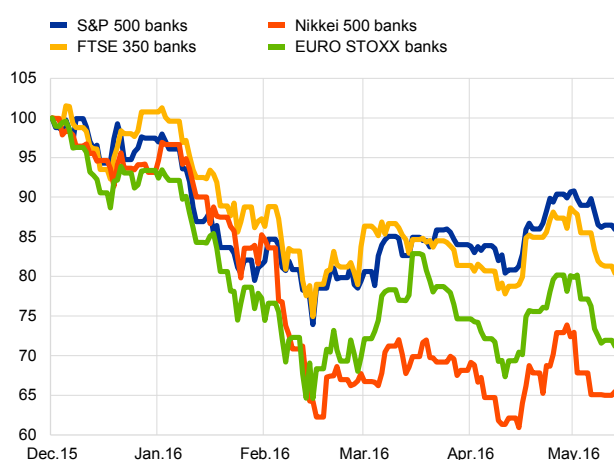
¹² The analysis in this subsection is based on data for up to 94 significant banking groups (SBGs) in the euro area. It should be noted that the sample of SBGs does not fully correspond to that of significant institutions that are under the direct supervision of the ECB. For instance, those significant institutions that are subsidiaries of other euro area SBGs or belong to non-euro area-based banking groups are not considered in the FSR analysis. For more details on the bank sample, see *Financial Stability Review*, ECB, November 2013, Box 5. At end-2015 SBGs accounted for over 95% of SSM significant institutions' total assets.

exposures, which also contributed to the negative sentiment. The market turmoil was exacerbated by uncertainty among investors regarding the implementation of bail-in rules that came into full effect in 2016, crystallising in a self-reinforcing negative spiral between credit and equity markets via the market for additional Tier 1 (AT1) instruments (possibly on account of a higher perceived risk of missed coupon payments).

Chart 3.1
Euro area bank shares have underperformed UK and US peers since last December

Bank equity indices for key regions

(1 Dec. 2015 – 13 May 2016; daily data)

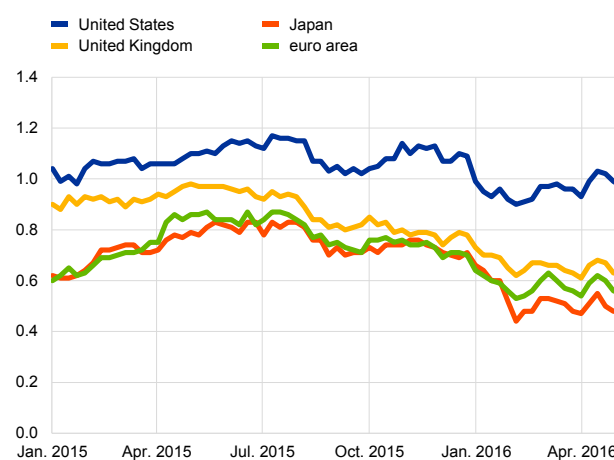


Sources: Bloomberg and ECB.

Chart 3.2
Euro area banks' price-to-book ratios remain well below those of US peers

Banks' price-to-book ratios in key regions

(1 Jan. 2015 – 13 May 2016; weekly data)



Sources: Bloomberg, Thomson Reuters Datastream and ECB.

Market scepticism regarding banks' earnings outlook pushed already depressed euro area bank price-to-book ratios down further. Market pessimism concerning banks extended to developed economies around the globe, implying a continuing wedge between euro area and US banks' price-to-book ratios, while euro area banks' valuations are more similar to those of their Japanese peers (see [Chart 3.2](#)). Apart from a challenging earnings outlook, low market valuations for euro area banks may also partly reflect the structural challenges euro area banks are facing in adjusting to a post-crisis intermediation model.

Banks' financial performance moderately improved in 2015, but the earnings outlook remains subdued

Euro area banks' profitability improved moderately in 2015 compared with 2014, yet it remains at low levels. This overall improvement was accompanied by a narrowing dispersion across banks, largely due to more pronounced improvements at the weaker-performing banks, albeit from negative or very low levels (see [Chart 3.3](#), left-hand panel). For a sub-sample of quarterly reporting SBGs, the evolution of quarterly profitability indicators signalled a weakening earnings momentum in the fourth quarter of 2015 (see [Chart 3.3](#), right-hand panel). While this partly reflects seasonal patterns, weaker results were also due to more difficult financial market

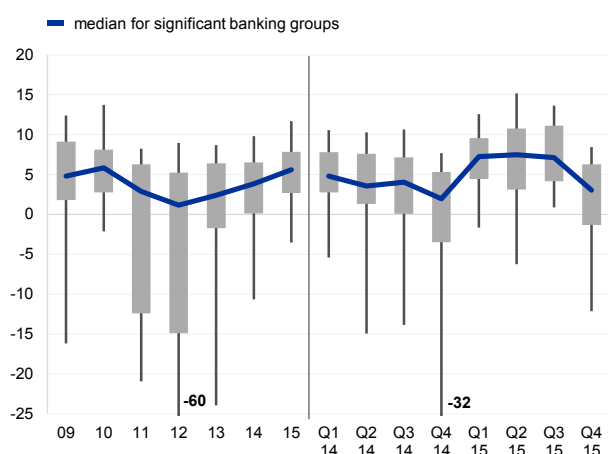
conditions, which weighed on both fee and trading income, as well as due to some decline in the positive contribution from net interest income.

Chart 3.3

Slight pick-up in euro area banks' profitability in 2015 as a whole, but weaker performance in the last quarter

Return on equity for euro area significant banking groups

(2009 – Q4 2015; percentages; 10th and 90th percentiles, interquartile range and median for SBGs)



Source: SNL Financial.

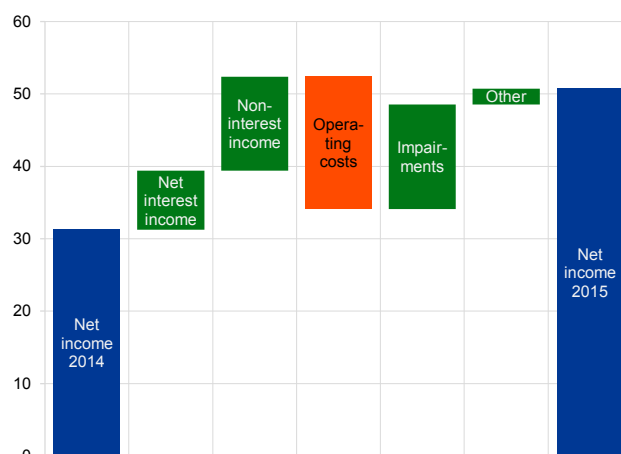
Notes: Based on publicly available data on significant banking groups. Annual and quarterly data are based on a sample of 79 and 43 SBGs respectively.

Chart 3.4

The increase in euro area banks' aggregate net profits was mainly driven by lower impairments and higher non-interest income

Decomposition of changes in euro area SBGs' net income

(2014-15; EUR billions)



Sources: SNL Financial and ECB calculations.

Note: Based on publicly available data for a sample of 83 euro area SBGs.

The annual increase in euro area SBGs' aggregate profits in 2015 was mainly driven by higher non-interest income and lower loan loss provisions. The

increase in net interest income also contributed to an improvement in profits, while higher operating costs had the opposite effect (see [Chart 3.4](#)). The positive effect of lower impairments was more pronounced, on average, at banks with high provisioning levels in 2014. Despite this improvement, impairments account for more than half of pre-impairment operating profits at a number of banks, thereby still dampening overall profitability. Furthermore, some banks located in countries most affected by the financial crisis, with still increasing non-performing loans (NPLs), recorded higher provisions pushing them into an overall loss.

This improvement notwithstanding, euro area banks' profitability remains at low levels mainly owing to the challenges for banks to increase revenues in a low nominal growth and low interest rate environment. While both net interest and non-interest income increased in absolute terms, euro area SBGs' operating

income as a percentage of total assets increased only slightly in 2015, in contrast with a more marked improvement in 2014.

Looking ahead, analysts have continued to revise down their expectations for banks' future profitability over the past twelve months. The downward revision of return on equity (ROE) forecasts for euro area banks since mid-2015 was more pronounced than for peers in other EU countries and in the United States (see [Chart](#)

3.5). Accordingly, of all the major geographical regions, bank profitability levels are expected to be the lowest in the euro area.

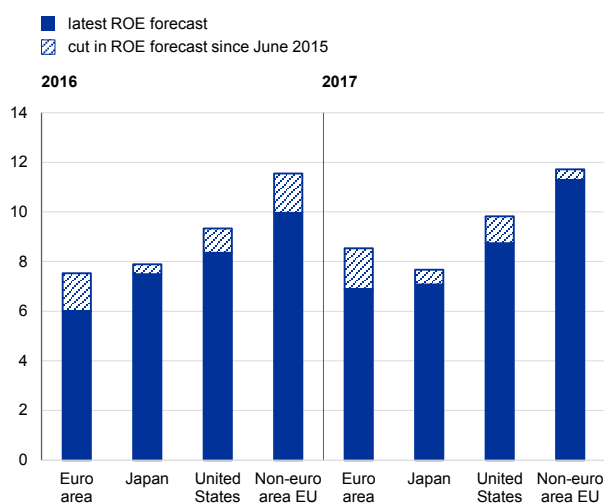
Earnings forecast downgrades for euro area banks were mainly driven by lower net interest income expectations. Since mid- 2015 analysts have lowered euro area banks' net income prospects for 2016 and 2017 by over 20% on average, possibly reflecting increased concerns about banks' ability to generate revenues in an environment of very low (or negative) interest rates as well as, in some cases, negative earnings surprises in the Q4 reporting season. Looking at forecasts for the main profit components, the prospects for net interest income – and to a lesser extent for fee income - worsened significantly for both 2016 and 2017, while somewhat higher provisioning cost expectations also contributed to the downgrade of 2016 net income forecasts (see **Chart 3.6**).

Chart 3.5

Profitability expectations down across the globe, but lowest for euro area banks

Analyst forecasts for 2016 and 2017 return on equity by region

(2016-17; percentages and percentage changes since June 2015)



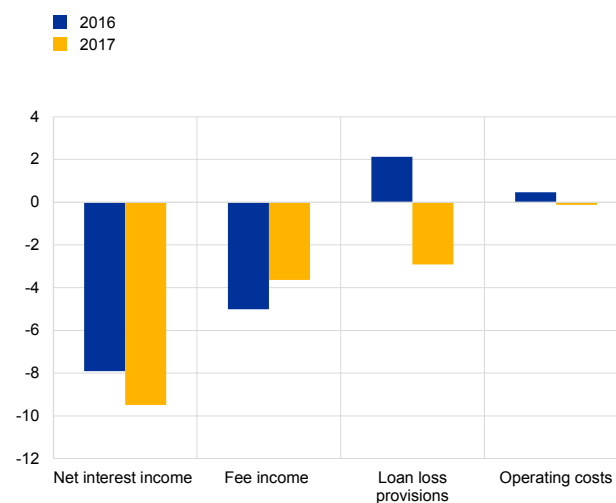
Sources: Bloomberg and ECB calculations.
Note: Based on consensus forecasts for listed banks by region.

Chart 3.6

Earnings forecast downgrades for euro area banks were mainly driven by the lowering of net interest income expectations

Analyst forecasts for the main components of euro area banks' net income for 2016 and 2017

(2016-17; percentage changes since June 2015)



Sources: Bloomberg and ECB calculations.
Note: Based on consensus forecasts for a sample of listed euro area banks.

Challenges for bank profitability stem from both cyclical and structural factors

First among the more cyclical factors, the current weak economic growth outlook and – by extension – the low interest rate and flat yield curve environment remain a key challenge for euro area banks' profitability. Despite some recovery in loan demand, lending growth remains subdued by historical standards which, coupled with continued pressure on margins, represents an important headwind for banks' net interest income. In a low interest rate

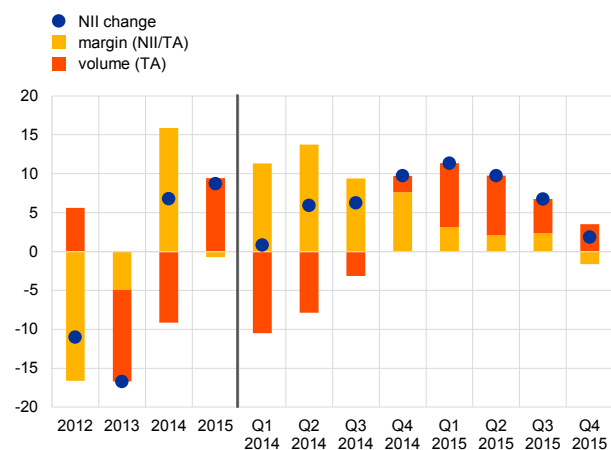
environment, high competition will continue to put downward pressure on lending rates, while deposit rates have little room to move lower, in particular on current account deposits, since they are hovering close to zero. As a result, margins will probably continue to narrow. That said, the positive impact of monetary policy accommodation – through increased credit volumes, lower impairment costs, capital gains on bond holdings as well as funding cost benefits from the second series of targeted longer-term refinancing operations (TLTRO II) – could help offset the pressure on margins.

Chart 3.7

Net interest income increased in 2015 as a whole mainly due to volume effects, while the margin effect was close to neutral

Decomposition of changes in euro area SBGs' net interest income

(2012-15; Q1 2014 – Q4 2015; EUR billions)



Sources: SNL and ECB calculations.

Notes: Decomposition of changes in annual and quarterly net interest income is based on aggregate data for 73 and 29 SBGs respectively. Quarterly data are annualised. NII stands for net interest income and TA for total assets.

Looking at recent developments, net interest income showed resilience in 2015 mainly as a result of positive volume effects, which more than offset the close-to-neutral margin effects. This was in

contrast with 2014 when positive margin effects (proxied by the ratio of net interest income to average total assets) dominated negative volume effects (measured by changes in average total assets). A similar decomposition of (year-on-year) changes in quarterly net interest income, albeit for a smaller sub-sample of SBGs, reveals that the positive margin effect on net interest income has gradually eroded since the last quarter of 2014 (see [Chart 3.7](#)). This is consistent with patterns usually observed in a low interest rate environment where funding cost declines initially outweigh the compression of asset yields, but their favourable impact fades away, the longer rates remain at very low levels.

Going forward, the impact of low/negative rates on bank profitability will vary due to differences in banks' ability to reprice deposits, in the interest rate sensitivity of their assets as well as in the

relative share of net interest income. Banks in countries with already low average deposit rates have less room to reprice, especially where the share of current account deposits is higher than average. Regarding asset repricing, the impact of low rates could be more immediately felt in countries with predominantly floating rate (mortgage) lending. Nevertheless, banks' margins in fixed rate countries could also be negatively affected in the longer term as a result of mortgage loan renegotiations, which significantly increased in some countries in 2015, although in the short term this is offset by prepayment fees. Finally, banks or banking sectors with a higher reliance on net interest income for revenue generation will be more affected by the impact of low rates on margins.

Part of the pressure on net interest income can be offset by higher non-interest income, although its positive impact on profits diminished in the second half of 2015. The median ratio of fee income to total assets edged up in 2015 compared with a year earlier, mainly reflecting an increased contribution from investment service-related fees (in particular asset management). The growth in net

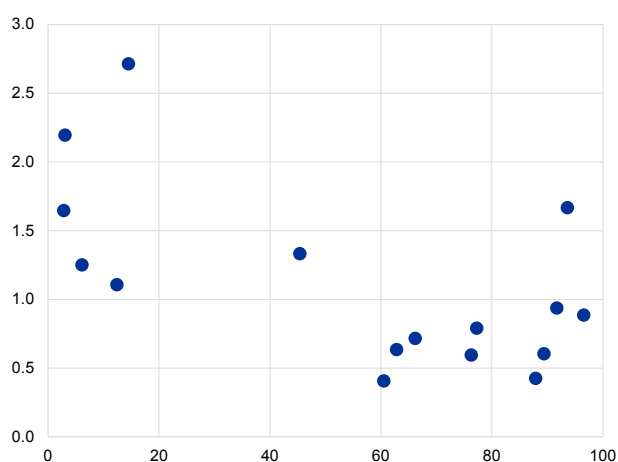
fee and commission income halted in the second half of 2015, however, partly due to a drop in investment fund inflows. Similarly, corporate and investment banking-related fees (e.g. those related to debt and equity issuances) dwindled in the last two quarters of 2015 on account of higher volatility in financial markets.

Chart 3.8

Room for deposit and mortgage repricing varies across countries, with some facing margin pressure from both sides

Share of variable rate mortgages and average deposit rates in euro area countries

(x-axis: share of floating rate mortgages, 2015; y-axis: average deposit rate, March 2016; percentages)



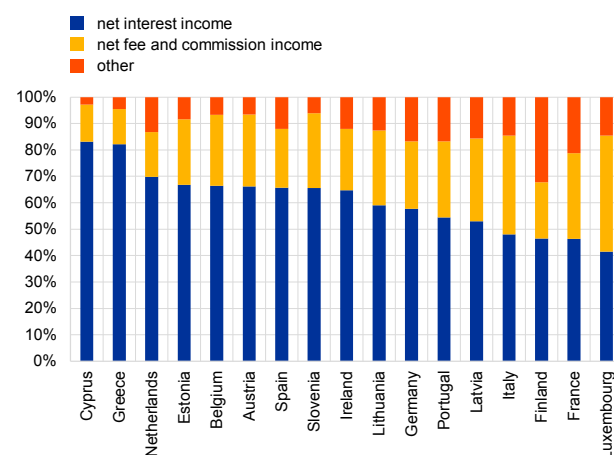
Sources: ECB and ECB calculations.
Note: Average deposit rate on outstanding amount of household and corporate deposits with agreed maturity.

Chart 3.9

Reliance on net interest income varies across countries, with some countries benefiting from the higher share of fee income

Banks' income structure in euro area countries

(Q1 2015 – Q3 2015; percentages)



Source: ECB consolidated banking data.
Note: Country-level data are based on domestic banking groups and stand-alone banks, foreign (EU and non-EU) controlled subsidiaries and foreign (EU and non-EU) controlled branches.

Banks' trading income followed a similar pattern, with an improving first half contrasting with weaker trading results in the third and fourth quarters of 2015.

The drop in the second half of 2015, while partly seasonal, came against the backdrop of worsened financial market conditions. Moreover, indicators of financial and capital market activity in the first two months of 2016 suggest the continuation of this trend into the first quarter, unlike in previous years when trading results were typically the strongest in this period.

A second cyclical challenge is related to increased profitability risks stemming from banks' emerging market economy (EME) and energy exposures.

While exposures to these vulnerable regions and sectors remain contained on aggregate, further deterioration in some vulnerable EMEs and in the commodity sector also has the potential to weaken some euro area banks' profitability, for instance through reduced revenues and higher credit losses (see the part on asset quality for more details).

Turning to structural factors, higher capital requirements and the resultant lower leverage have contributed to a downward shift in bank profitability since the crisis. Taking a longer-term view, a decomposition of return on equity into its constituent parts (i.e. return on assets and leverage) shows that falling leverage has

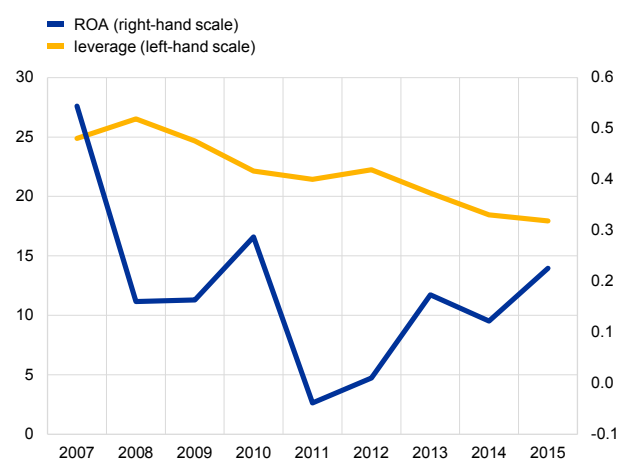
contributed to a decline in banks' return on equity since 2008 (see [Chart 3.10](#)). At the same time, banks' return on assets (ROA) has recovered somewhat from its low in 2012, but remains well below its pre-crisis level.

Chart 3.10

Lower leverage contributes to structural decline in profitability, while underlying profitability is still subdued amid flat revenues

Return on assets and leverage of euro area banks

(2007-15; percentage, multiple; weighted averages)



Source: SNL Financial.
Note: Based on aggregate data for a sample of 63 SBGs.

Furthermore, a large stock of non-performing assets in certain banking sectors continues to dampen the profitability prospects of banks. The high stock of NPLs weighs on banks' capacity to extend new loans (see [Chart 7](#) in the Overview), thereby limiting credit volume growth, while it also ties up operational capacity and involves legal as well as administrative costs. In turn, weak profitability and the reduced capacity for internal capital generation constrains banks' ability to more decisively deal with NPLs, for instance by significantly raising coverage ratios (see the next part for more details on asset quality challenges).

In addition, a number of banks are still in need of adapting their business models to the new operating environment characterised by stricter regulatory requirements as well as low interest rates. Banks' responses will differ depending on, among other things, the extent to which their business activities are diversified, the scope to further increase cost efficiency or the competitive situation in the

national banking sectors they operate in. Given the cyclical profitability challenges arising from the low interest rate environment, banks will be incentivised to diversify revenue sources, in particular by increasing the share of fee and commission income. Banks may also look to further increase their cost efficiency, for instance by changing operating models and improving multichannel distribution capacities and IT systems (see Special Feature C for a detailed discussion).

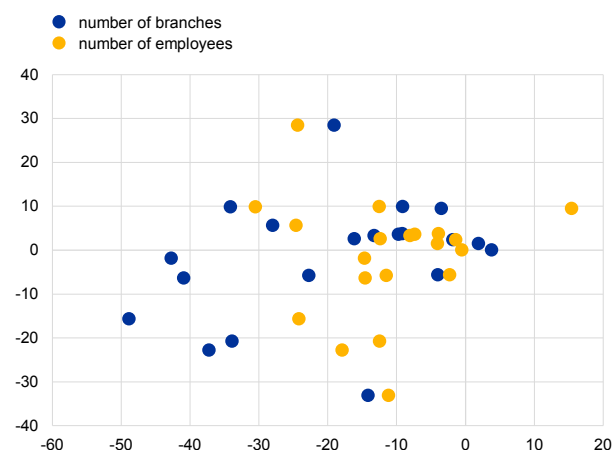
Amid continued pressure on revenues and the increased threat from non-bank competitors (e.g. fintech companies), cost containment remains a priority for banks in order to preserve overall profitability. That said, euro area banks in general made little progress in achieving cost-efficiency gains in 2015, with the median ratio of operating costs to total assets edging up and the median cost-to-income ratio unchanged from a year earlier. For banks experiencing a deterioration in cost-efficiency indicators, reasons include one-off contributions to the national resolution fund (in the case of Italian banks) or higher restructuring costs as part of the implementation of new business strategies in the case of some banks. Some banks have announced ambitious cost-cutting targets as part of their restructuring plans that, among other things, involve a rationalisation of the retail branch network, also as a response to increased customer demand for the use of banking services via digital platforms.

Chart 3.11

Branch network rationalisation and headcount reductions brought efficiency gains in some euro area banking sectors

Change in the number of bank branches/employees versus the change in the cost-to-income ratio in euro area countries

(2009-14; x-axis: change in the number of branches (blue) and employees (yellow); percentage changes; y-axis: change in the cost-to-income ratio; percentage point changes)



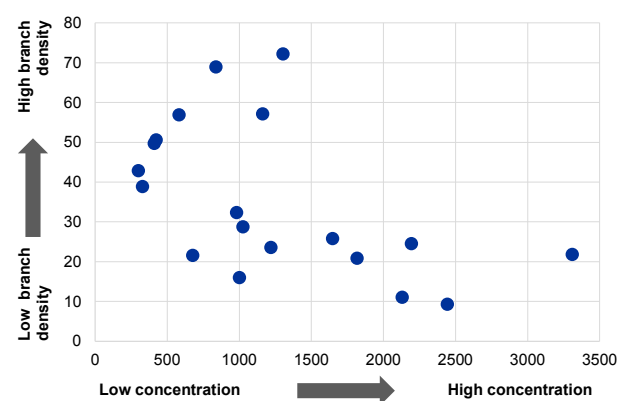
Sources: ECB and ECB calculations.

Chart 3.12

Low market concentration and high branch density in some countries suggest there is scope for efficiency gains from consolidation

Market concentration and branch network density in euro area countries

(2014; x-axis: Herfindahl-Hirschman index; y-axis: number of bank branches per 100,000 people)



Source: ECB.

Structural challenges to profitability could also arise from overcapacity in some banking sectors. Indicators of market concentration, cost efficiency and capacity suggest that the euro area banking sectors have become less concentrated and somewhat improved their cost efficiency since the financial crisis. Branch network rationalisation and headcount reductions since the financial crisis have brought some improvement in banks' cost-to-income ratios, but not in all cases (see [Chart 3.11](#)), suggesting that cost-cutting alone is not sufficient to achieve lasting cost-efficiency gains. Significant differences in market concentration remain across countries, however, with some banking sectors characterised by low market concentration and/or a high branch network density (see [Chart 3.12](#)). While low market concentration in some cases is a reflection of structural features of the banking sector (e.g. the important role of savings or cooperative banks), it could also hinder the recovery of bank profitability¹³.

In more fragmented banking systems, further consolidation could bring some profitability benefits at the sector level by increasing cost and revenue synergies. Low market concentration coupled with above-average cost-to-income ratios in some banking sectors suggest that there is scope for efficiency gains from consolidation without exacerbating "too-big-to-fail" problems. In this respect, initiatives taken at a national level to improve corporate governance in some

¹³ According to ECB analysis, there is some empirical evidence that euro area banks operating in less concentrated markets tended to be less profitable in the period between 1991 and 2013. See *Financial Stability Review*, ECB, May 2015, Special Feature A. At the same time, in countries with a high level of concentration (for instance, with a Herfindahl-Hirschman index of at least 2500), monopoly power may trigger concerns about the level of competition.

segments of the euro area banking sector – such as the reform of *popolari* banks and the Banche di Credito Cooperativo (BCC) in Italy – could help create a more favourable environment for mergers. Despite some recently announced, bigger-scale mergers in the German cooperative and Italian *popolari* sectors, overall progress in bank consolidation, in particular across borders, remains limited to date.

Box 4

Financial stability vulnerabilities stemming from cyber risks within financial market infrastructures

A convergence of globalisation and digitalisation has created a financial ecosystem and operational network which is increasingly interconnected and interdependent. In this context, computing and digitalisation are becoming increasingly pervasive. Notwithstanding the many benefits this has brought, this convergence has also increased the susceptibility to cyber attacks.¹⁴ There is a trend towards more frequent and severe cyber attacks, and the composition of the attacks is changing amid growing digitalisation, both of which have financial stability implications. In particular, material financial stability risks might stem from individual systemically important firms or from any prospect of excessive financial market volatility.

One key area of financial stability concern regarding cyber attacks is their potential to disrupt financial market infrastructures (FMIs). Indeed, such infrastructures have become increasingly interconnected and interdependent as an operational network with several critical nodes, as well as harbouring large amounts of confidential data. Such attacks could, in this way, seriously undermine confidence and trust in the financial system. On a daily basis, this network delivers financial intermediation between market participants and end-users, whether the transmission of salaries through FMIs or the settlement of central bank/market transactions through a web of payment and settlement systems, clearing houses, settlement banks and custodians. In a recent survey on critical infrastructures, 48% of respondents found it likely that a cyber attack will take down their critical infrastructure¹⁵; one study has estimated that cyber crime costs the global economy some USD 400 billion in annual losses¹⁶; and another study reveals that 83% of financial service organisations experience more than 50 network attacks per month and take an average of 98 days to identify an attack.¹⁷

Over the last decades, there has been a marked increase in both the frequency and severity of cyber attacks. According to a study by PricewaterhouseCoopers, the number of detected cyber attacks increased sharply during 2015, up by 38%.¹⁸ As recently as 15 years ago, cyber attacks were fairly rudimentary and typically the work of “hacktivists”. However, this appears to be changing with increasing interconnectivity, globalisation and what could be termed a commercialisation of cyber crime.

¹⁴ See the top 10 global risks listed in [Global Risks](#), World Economic Forum, 2015.

¹⁵ [McAfee Labs 2016 Threats Predictions](#) report.

¹⁶ [Net Losses: Estimating the Global Cost of Cybercrime](#), Center for Strategic and International Studies and McAfee, June 2014.

¹⁷ “Risk & Innovation in Cybersecurity Investments”, Ponemon Institute, 2015.

¹⁸ [The Global State of Information Security Survey 2016](#), PricewaterhouseCoopers.

Amid this growing volume of cyber attacks, there has been an evolution in the nature and motivations of the threat actors and their levels of sophistication. The actors have changed significantly over recent years. They range from state-sponsored groups, nation-state proxies, terrorist groups and private enterprises/corporations, to cyber criminals, hacktivists, insiders and lone actors. The nature of the agent attacking an organisation will determine both its objectives and its sophistication. This, in turn, will be reflected in the persistence and breadth of the attack (in terms of the type of hacking tools and resources deployed and the time taken to compromise the organisation). The Threat Landscape 2015 report of the European Union Agency for Network and Information Security (ENISA) notes a number of attack types (e.g. advanced persistent threat attacks), each of which is composed of a number of tactics and tools, such as malware, phishing and denial of service.¹⁹

Alongside the growing volume and changing nature of attacks, there has been an increasing trend towards digitalisation, thereby increasing the cyber attack surface. More users, data, devices, clouds and network traffic will increase the number of potential routes for attacks; and to further complicate matters, much of this technological advancement will be interlinked with existing IT systems within key financial market participants. Within this complex technological web, a proliferation of threats and vulnerabilities is also likely, notably for critical nodes in the financial system such as FMIs.

All in all, the regulatory response amid a growing prevalence of digitalisation in the financial system recognises both the benefits and the potential vulnerabilities. Digital platforms create more efficient, transparent and in many ways complete global markets. This innovation opens up new possibilities for strengthening economic growth, but these developments must flourish within a safe, efficient and robust financial system. Initiatives are under way to ensure adequate monitoring of these risks across all key financial market players.²⁰ When it comes specifically to FMIs, global regulators have already initiated efforts to tackle cyber risk, for example by developing the CPMI-IOSCO's Guidance on cyber resilience for financial market infrastructures.²¹ Taken together, these initiatives should ensure that regulators, overseers and supervisors of FMIs contribute to strong cyber resilience capabilities, enhance sector resilience and information-sharing and, more generally, foster cooperation and coordination on cyber risks among central banks and other relevant authorities.

Unresolved legacy assets weigh on new lending, while new credit quality concerns emerge in some regions/sectors

The large stock of unresolved non-performing assets in some parts of the euro area not only contributes to profitability challenges, but also weighs on banks' capacity to provide new loans. Resolving non-performing loans is key to freeing up banks' capital, restructuring the non-financial sector and reviving lending to the

¹⁹ [ENISA threat landscape: top 15 cyber threats 2015](#).

²⁰ For banks, the SSM has indeed identified IT and cyber crime risk as a [key supervisory priority](#) for 2016.

²¹ [Guidance on cyber resilience for financial market infrastructures](#), Committee on Payments and Market Infrastructures/Board of the International Organization of Securities Commissions, November 2015.

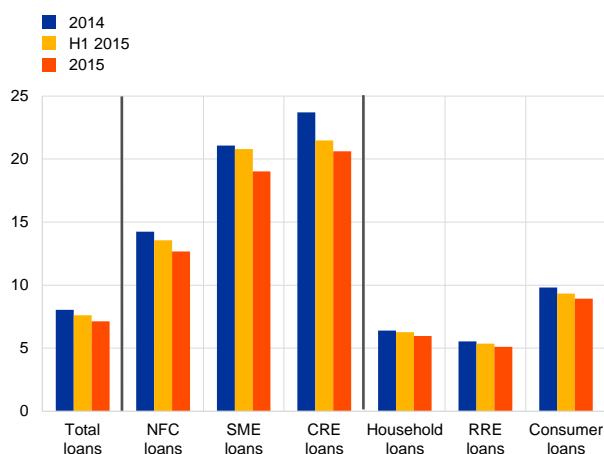
economy. However, progress in removing NPLs from balance sheets remains limited in particular in some of the countries with the highest NPL ratios.

Chart 3.13

Banks' asset quality slightly improved in the second half of 2015, but non-performing loan ratios remain elevated in the SME sector

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

(2014-15; percentage of loans; weighted average across SBGs)



Source: ECB.

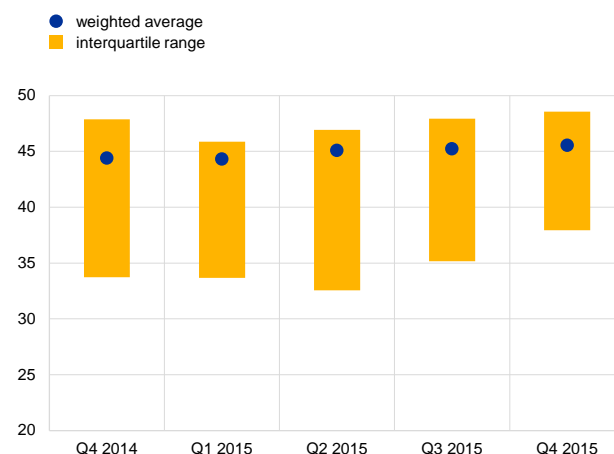
Notes: Non-performing loan ratios are shown only for selected sectors/loan types. CRE and RRE stand for commercial real estate and residential real estate respectively.

Chart 3.14

Coverage ratios slightly improved in the second half of 2015 on aggregate, with more pronounced increases in countries with below-average provisioning coverage

Coverage ratios of significant banking groups in the euro area

(Q4 2014 – Q4 2015; percentages)



Source: ECB.

Notes: Based on country aggregates for SBGs. Coverage ratio is defined as the ratio of accumulated impairments on NPEs to total NPEs.

Looking at recent trends, euro area banks' asset quality slightly improved in the second half of 2015 mainly driven by a decline in non-performing loan ratios in the corporate sector. The aggregate non-performing exposure (NPE) ratio for SBGs (for loans and advances) dropped to 7.1% at end-2015 from 7.6% in June 2015. The rate of NPE reductions picked up in this period, with a 4% decline in the second half of 2015 compared with only 1% six months earlier. In some cases, however, the reductions in NPEs were partly offset by an increase in foreclosed assets. Despite improvements in the second half of last year, NPE ratios continue to be the highest for SME and commercial real estate (CRE) loans (see [Chart 3.13](#)). The quality of household loan portfolios improved only modestly, with aggregate NPE ratios for residential mortgage and consumer loans standing around 5% and 9% at end-2015, respectively.

Similarly, the coverage of non-performing loans by loan loss reserves improved slightly in the second half of 2015. The aggregate ratio of reserves to NPEs (for loans and advances) edged up from 45% in the second quarter of 2015 to 46% at end-2015 and the dispersion across countries narrowed somewhat. This was, in particular, due to improved coverage ratios in countries where banks have below-average provisioning coverage (see [Chart 3.14](#)). Coverage ratios vary across loan types, with collateralised loans expectedly showing the lowest NPE coverage (27% for residential mortgage loans, 36% for CRE loans). At the other end of the

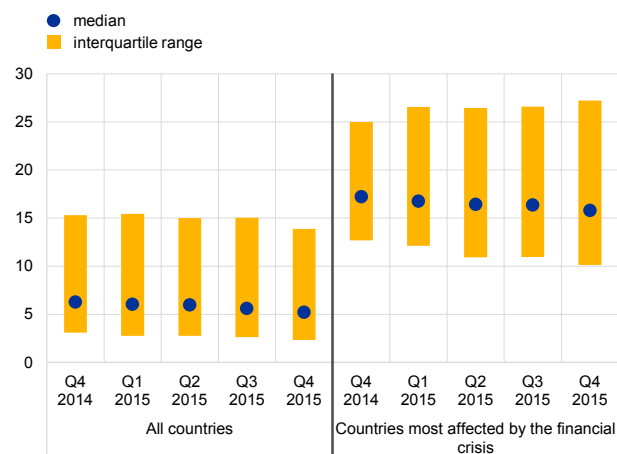
spectrum, non-performing consumer loans have the highest provisioning coverage with 65%.

Chart 3.15

Banks' NPE ratios remain persistently high in some vulnerable countries

Non-performing loan ratios of significant banking groups in the euro area

(Q4 2014 – Q4 2015; percentage of loans; median and interquartile range for SBGs)



Source: ECB.

Note: Euro area countries most affected by the financial crisis include Cyprus, Greece, Ireland, Italy, Portugal, Slovenia and Spain.

Despite recent modest improvements, NPE levels remain persistently high in some jurisdictions, pointing to a lack of progress in the clean-up of balance sheets.

Within the group of countries that were the most affected by the financial crisis, dispersion widened across banks in terms of asset quality in the second half of 2015. While banks in some countries (notably Spain and Ireland) managed to reduce their NPEs, a number of banks in other vulnerable countries saw their NPE ratios rise further (see [Chart 3.15](#)). In another sign of persistently high NPLs, the share of NPEs that are past due by more than one year represented 58% of SBGs' NPEs at end-2015, on average, up from 52% a year earlier.

The results of a bank-level early warning model developed by ECB staff suggest that remaining bank-specific vulnerabilities are, in most cases, linked with weak asset quality of euro area banks.

The latest results of the model show that the aggregate forward-looking distress probability for euro area banks decreased further in the last quarter for which data are

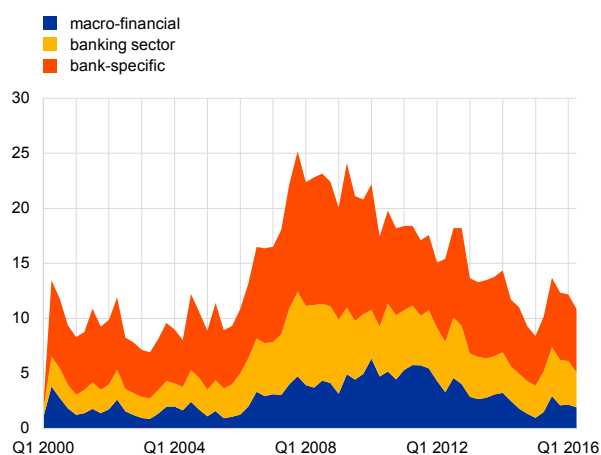
available and remains well below the peaks reached during 2007 (see [Chart 3.16](#)). A decomposition of the latest distress probabilities into contributing factors suggests that remaining fragilities in the euro area banking sector are mainly linked to bank-specific and country-level banking sector factors, while macro-financial factors, such as house prices or government bond yields, play a lesser role in most countries. Changes in bank-level distress probabilities suggest a fair degree of heterogeneity across banks (see [Chart 3.17](#)). In fact, distress probabilities increased for some banks that were partly linked to a further worsening of asset quality.

Chart 3.16

Euro area banks' probability of distress within the next two years remains well below the peaks reached during 2007

Aggregate distress probability for euro area banks

(Q1 2000 – Q2 2016; percentage probability 1-8 quarters ahead; y-axis: weighted average distress probability)



Source: ECB calculations.

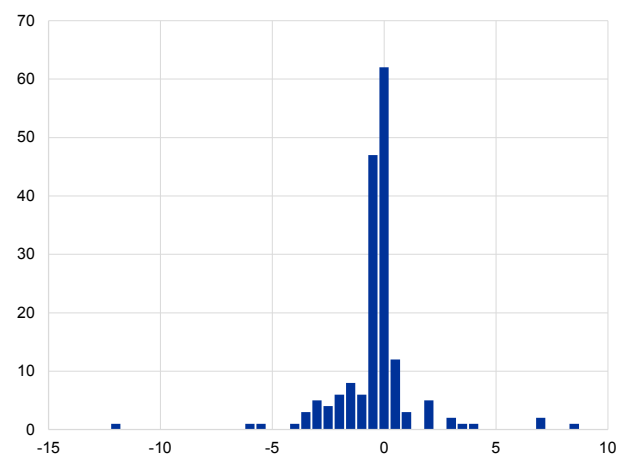
Notes: The results are based on a bank-level logit model with 11 risk drivers, built to indicate bank distress probabilities with a prediction horizon of one-to-eight quarters ahead. Bank distress events encompass bankruptcies, defaults, liquidations, state-aid cases and distressed mergers. The aggregation is done by weighting the bank-specific distress probabilities by the respective banks' shares in aggregate euro area bank assets. The decomposition of individual distress probabilities into the different factors is done by using the (relative) distress probabilities that would prevail if all other variable blocks were set to their mean values. All results are derived from publicly available information. Further details about the underlying method and dataset can be found in Lang, J. H., Peltonen, T. and Sarlin, P., "A framework for early-warning modeling with an application to banks", *Working Paper Series*, ECB, forthcoming.

Chart 3.17

Changes in bank-level distress probabilities also signal an improvement, although not for all banks

Changes in bank-level distress probabilities

(Q4 2015 – Q2 2016; percentage changes; x-axis: number of banks; y-axis: change in distress probability between Q4 2015 and Q2 2016)



Source: ECB calculations.

Notes: The results are based on a bank-level logit model with 11 risk drivers, built to indicate bank distress probabilities with a prediction horizon of one-to-eight quarters ahead. Bank distress events encompass bankruptcies, defaults, liquidations, state-aid cases and distressed mergers. The aggregation is done by weighting the bank-specific distress probabilities by the respective banks' shares in aggregate euro area bank assets. The decomposition of individual distress probabilities into the different factors is done by using the (relative) distress probabilities that would prevail if all other variable blocks were set to their mean values. All results are derived from publicly available information. Further details about the underlying method and dataset can be found in Lang, J. H., Peltonen, T. and Sarlin, P., "A framework for early-warning modeling with an application to banks", *Working Paper Series*, ECB, forthcoming.

In countries with systemic NPE issues, the high level of unresolved legacy problem assets weighs on banks' profitability and it also holds back new lending. The high stock of NPLs weighs on credit conditions, as illustrated by the positive relationship between country-level NPE ratios for NFC loans and NFC lending rates (see [Chart 3.18](#)). In a similar vein, banks with higher NPLs tend to lend less, as shown by the lower (negative) median loan growth in the worst two NPE ratio quartiles (see [Chart 7](#) in the Overview).²²

This highlights the need for more rapid progress in NPL resolution, as NPL sales and write-offs remained moderate. The rate of NPL sales and write-offs picked up somewhat in 2015 in the euro area, although progress remained rather uneven across countries. While recent advances in the legal framework (e.g. by improving insolvency procedures) as well as other measures to facilitate more effective NPL resolution (such as the guarantee scheme for the securitisation of NPLs and the establishment of Fondo Atlante in Italy) are welcome developments in this regard, further significant progress is needed in some countries to bring NPLs down to manageable levels. Faster progress is partly made difficult by the limited

²² Apart from large NPEs, other factors such as high credit risk in some countries and sectors may also dampen credit growth.

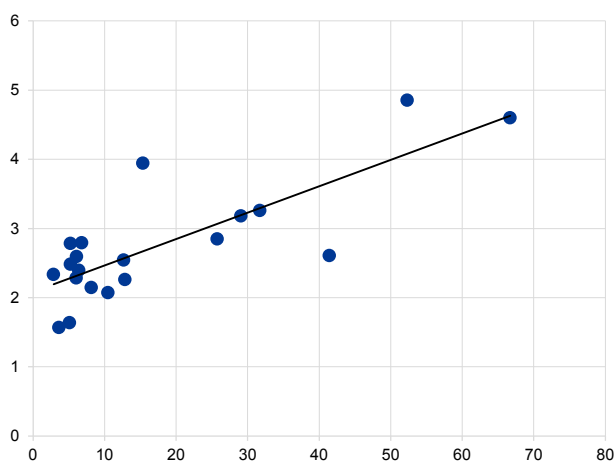
buffers some banks have against further credit losses, as indicated by still high Texas ratios (see [Box 5](#)). While a number of banks have a significant amount of collateral behind NPEs, over-reliance on the expected recovery of collateral values might also be a disincentive to accelerating the reduction of NPEs.

Chart 3.18

High NPL rates in some countries continue to weigh on credit conditions

Interest rates on loans to NFCs versus NPE ratios on NFC loans in euro area countries

(percentages; NFC NPE ratios in Q4 2015 (x-axis) and NFC lending rates in March 2016 (y-axis))



Source: ECB.

The resolution of the large post-crisis NPE overhang in some euro area countries requires a comprehensive strategy involving coordination of all relevant stakeholders.

That said, there is no single one-size-fits-all solution to the NPE problem and efficient policy for NPE resolution needs to consider the country-specific economic conditions and operational environment, including the impediments to effective resolution. A comprehensive strategy should include, among other things, measures aiming to improve the legal environment relevant for NPE workouts, for instance by introducing efficient personal and corporate insolvency frameworks as well as speeding up debt recovery. In parallel, banks burdened with high NPEs should strengthen internal workout capabilities and, if needed, use the external expertise of distressed asset managers. Authorities should support the development of an NPE servicing industry and of an efficient NPE market, as well as the carve-out of specific NPE portfolios and their transfer to special-purpose vehicles (SPVs) or their outright sale on the market.

Beyond the challenges arising from legacy problem assets, some euro area banks are faced with rising credit quality concerns relating to their exposures to emerging economies and commodity sectors.

Credit risks emanating from exposures to EMEs have increased materially since late 2015, amid a further weakening in economic growth prospects in a number of EMEs. While backward-looking indicators of banks' asset quality showed only a gradual deterioration in 2015 in most of the larger EMEs (see [Box 1](#)), elevated debt servicing ratios, coupled with the worsening of borrowers' debt servicing capacity, suggest that banks with significant exposures to EMEs face the prospect of a further deterioration in asset quality in the period ahead. Credit quality trends diverged somewhat in 2015 between the EME regions where euro area banks are most exposed, with a modest deterioration in Latin America contrasting with an improvement of loan quality in emerging Europe (see [Chart D](#) in [Box 1](#)). In other EME regions, euro area banks' aggregate exposures to emerging Asia, the Middle East and North Africa and the Commonwealth of Independent States remain relatively contained, with an above-average NPL ratio in the latter two regions.

Euro area banks' exposure to commodity firms appears manageable on aggregate, but there is a wide dispersion across banks, with some institutions facing higher earnings risk related to these exposures.

For a sample of large euro area banks disclosing data on their commodity exposures (including to oil/gas

as well as metals and mining sectors), these account for around 35% of tangible equity on average, with individual exposures falling within a wide range of less than 10% to around 70%. Regarding the main structural features of euro area banks' energy/commodity exposures, the share of investment-grade exposures is typically over 60% (unlike for US regional banks which have a higher share of non-investment-grade exposures), while exposures with higher oil price risk (i.e. exploration and production) typically account for less than one-third of the total. Elevated earnings risk from these exposures is also reflected in higher loan loss expectations for these banks by analysts, albeit less so than for US counterparts. Nevertheless, banks with a higher concentration of exposures to riskier commodity segments face the risk of higher loan losses, in particular under a more adverse scenario of persistently low oil prices.

Box 5

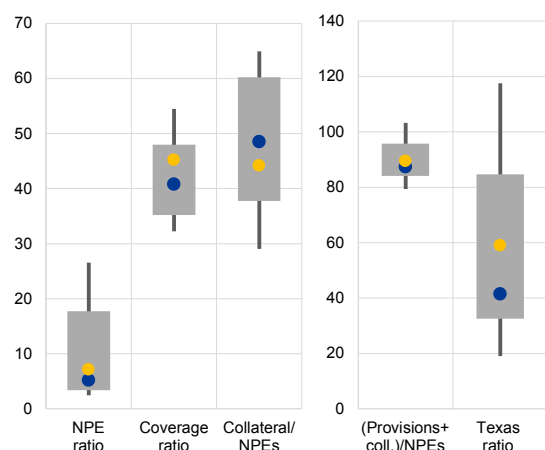
Latest indicators of euro area bank asset quality

Chart A

NPE ratios remain at rather elevated levels in euro area countries most affected by the financial crisis, although credit risk is partly mitigated by higher collateralisation

Distribution of country-level asset quality ratios in the euro area

(Q4 2015; percentages; median (blue), weighted average (yellow), 10th and 90th percentiles and interquartile range)



Sources: ECB and ECB calculations.

Note: Based on country aggregates calculated for significant institutions.

Euro area banks' asset quality has remained in the focus of both supervisors and market participants as banks' balance sheets in some countries are still burdened with a high level of non-performing exposures (NPEs).

Large public disclosures, including those associated with the ECB's comprehensive assessment and the European Banking Authority (EBA) 2015 transparency exercise, have helped to clarify the nature and extent of these NPEs. While euro area banks' solvency positions have improved significantly over the past few years, the NPE overhang remains a drag on banks' profitability and weighs on their ability to extend new loans. Against this background, this box presents an updated overview of the scale of the NPE problem in the euro area based on the latest supervisory data on NPEs, provisioning and collateral, and it also discusses some structural features that affect the speed of NPE resolution.

Euro area banks' NPE ratios remain elevated by international comparison and the high level of NPEs continues to be a key challenge for the financial system.

Euro area significant institutions held nearly €950 billion of NPEs at the end of 2015, equivalent to about 9% of euro area GDP. Euro area significant institutions' average NPE ratio, at 7.1%, is high by international standards and clearly exceeds those of US and UK peers.²³ NPE ratios vary widely across the euro

²³ The average non-current loan ratio (a proxy for the NPE ratio) of US banks stood at 1.5% at the end of 2015, while the average NPE ratio of UK banks participating in the EBA transparency exercise was 3.2% (based on data for the first half of 2015).

area, but remain at rather elevated levels in the majority of vulnerable countries. Within this country group, the median NPE ratio stood just below 20% at end-2015, but this group of countries itself is heterogeneous as indicated by a wide interquartile range between 18% and 34%.

The coverage ratio, as measured by loan loss reserves as a proportion of NPEs, stood at 45% on average for euro area significant institutions, but with considerable variation across countries. In some high NPE countries, provisioning levels remain at or even below the euro area average. Relatively low coverage ratios in these countries can be an impediment to more effective NPE resolution as they can contribute to wide pricing gaps between potential buyers and sellers of NPEs.

Relatively low provisioning coverage in some high NPE countries may partly reflect the higher collateralisation of loans and NPEs. The average ratio of collateral and guarantees to NPEs for euro area significant institutions was 44% at end-2015, although with significant differences across countries (see left-hand panel of Chart A). Countries that record high NPEs typically have a relatively high ratio of collateral and financial guarantees to NPEs, where collateral represents a much higher share than guarantees. The broad coverage ratio adjusted for collateral and guarantees on average stood at around 90% at end-2015, with the majority of vulnerable countries recording above-average values. At the same time, weak debt enforcement frameworks in some high NPE countries raise the cost of debt recovery and lengthen the time needed to repossess collateral.

Asset quality in the United States is often assessed by the so-called Texas ratio. The Texas ratio is a simple metric of bank balance sheet health which compares problem loans with the financial resources a bank has to absorb (further) losses from its troubled assets. It is typically defined as gross non-performing loans (NPLs) over tangible equity and loan loss reserves. The average Texas ratio for euro area significant institutions stood just below 60% at the end of last year, with some countries recording values above 100% (see right-hand panel of Chart A). Euro area banks' average Texas ratio is well above both the current level for US banks (below 10%) and the value measured in the first quarter of 2010 (31%) when NPL ratios peaked in the United States.

The persistence of high NPEs in the euro area, which stands in stark contrast to the rapid resolution of NPEs in the United States, partly reflects different structural features between the two regions and the relatively greater obstacles to effective NPE resolution in the euro area.²⁴ First, the important role of government-sponsored entities (GSEs) in the US mortgage market²⁵ implied that a significant part of residential mortgage-related NPLs were booked outside banks' balance sheets. Second, regulatory requirements that provide an overlay to accounting standards in the United States oblige banks to write down loans to the recoverable value of collateral after six months as well as to suspend interest income on NPLs once the loan is 90 days past due. By contrast, accounting standards in the European Union tend to lengthen write-offs or

²⁴ For a detailed overview of obstacles to effective NPE resolution in EU countries, see *Financial Stability Review*, ECB, May 2015, Special Feature C.

²⁵ In 2009 the two large GSEs (Fannie Mae and Freddie Mac) owned or guaranteed roughly half of all outstanding mortgages in the United States (including a significant share of sub-prime mortgages).

provide a disincentive to remove NPLs from the balance sheet.²⁶ Third, the unfavourable tax treatment of loan loss provisions and write-offs in several EU countries (e.g. tax deductions for loan loss provisions and write-offs have been or are still subject to a cap) provides a disincentive for quicker loan loss recognition and write-offs.²⁷ Fourth, the prevalence of non-recourse mortgages in many US states creates additional incentives for the timely resolution of NPLs. Finally, despite some recent pick-up in NPL disposals to third-party investors, the distressed debt market in the European Union remains small compared with that in the United States.

High levels of NPEs continue to be a key macroprudential concern in the euro area and progress in NPE resolution remains slow. However, in addition to harmonised data on NPE and coverage ratios, data on the collateral and guarantees behind these NPEs are important to assess asset quality figures. This latter information is a useful complement given the structural features of euro area banks' loan books, though it should be acknowledged that the lengthy and complex process to repossess collateral in some euro area countries may have negative implications for the recovery value of NPEs and collateral. Furthermore, the comprehensive analysis of asset quality problems should also account for structural factors that affect the speed of NPE resolution. In particular, the international comparison of asset quality indicators needs to be made with care given the important differences in features notably of an accounting, supervisory (provisioning and write-off rules), fiscal and structural nature. This also highlights the need for further progress in strengthening the operational environment for NPE resolution at both the country and European levels.

Bank capital positions improved further

Banks' solvency ratios improved further in the second half of 2015, helped by both increases in capital and risk-weighted asset declines. Euro area SBGs' common equity Tier 1 (CET1) ratio increased further in the last two quarters of 2015, both on a phased-in and fully loaded basis (see [Chart 3.19](#)). The improvement in banks' phased-in CET1 ratio was mainly driven by increases in CET1 capital, on aggregate, in particular in the last quarter of 2015 (see [Chart 3.20](#)). Risk-weighted asset declines, on average, had a positive but diminishing role in improving solvency ratios.

²⁶ For instance, International Financial Reporting Standards (IFRS) do not provide detailed guidance on write-off rules which in some cases forces banks to follow the stricter rules for loan cancellation, thereby lengthening the process of removing NPLs from the balance sheet. Furthermore, the accounting treatment of interest income allows banks to recognise interest on certain categories of NPLs, thereby providing a disincentive for resolving NPLs. Looking ahead, IFRS 9 (to be implemented from 2018) will include a clear definition of write-off that is different from loan cancellation. Under IFRS 9, banks are expected to write off loans earlier, opening the way for possible corporate restructuring or liquidation.

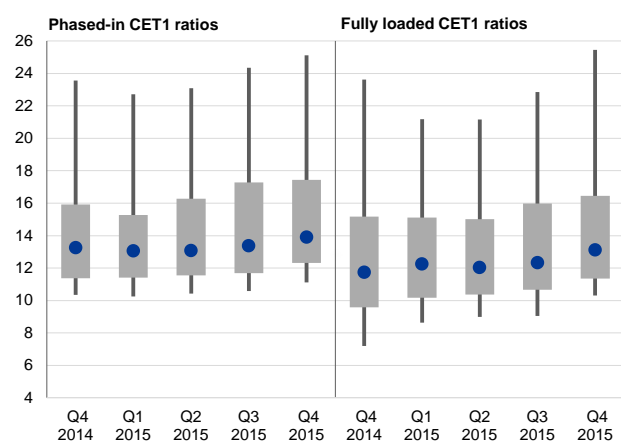
²⁷ In this respect, the implementation of IFRS 9 from 2018, where the accounting treatment of impairments is based on the expected loss principle, will help overcome some of these issues.

Chart 3.19

Solvency ratios improved in the second half of 2015

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

(Q4 2014 – Q4 2015; percentages; 10th and 90th percentiles, interquartile distribution and median)



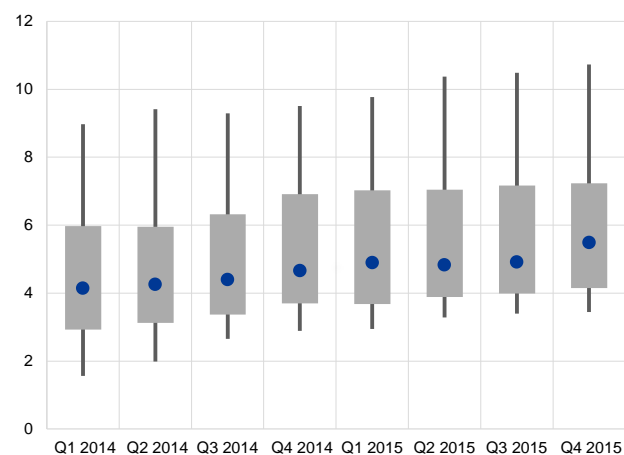
Source: ECB.

Chart 3.21

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

Fully loaded Basel III leverage ratios of significant banking groups in the euro area

(Q1 2014 – Q4 2015; percentages; medians and interquartile ranges)



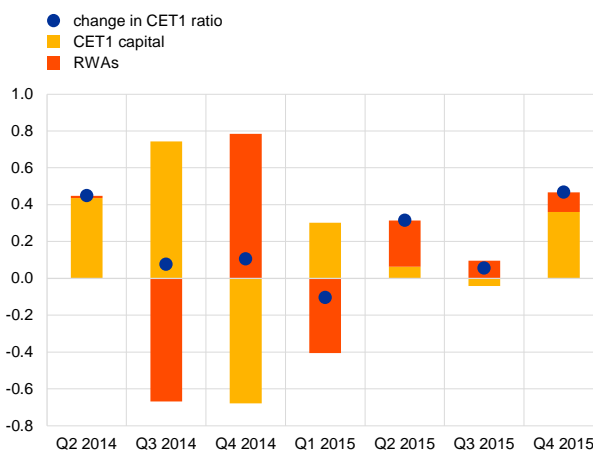
Source: ECB.

Chart 3.20

The improvement in phased-in CET1 ratios in late 2015 was mainly driven by increases in capital

Contribution of changes in capital and risk-weighted assets to phased-in common equity Tier 1 capital ratios

(Q2 2014 – Q4 2015; percentage points)



Sources: ECB and ECB calculations.

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

Euro area banks' leverage ratios also continued to improve in the second half of 2015.

At end-2015 leverage ratios reached at least 4% for the large majority of SBGs (see [Chart 3.21](#)). Differences across banks of different sizes persisted, with euro area G-SIBs remaining significantly more leveraged than other SBGs. The median leverage ratio for G-SIBs was slightly below 4% at end-2015, compared with a median ratio of 5.5% for the full sample of SBGs. According to the latest Basel consultation document, G-SIBs are likely to face leverage ratio requirements in excess of 3%.

Looking ahead, banks' capital requirements will also be shaped by the final changes to the capital framework that are aimed at reducing the excessive variability of risk-weighted assets and strengthening risk sensitivity.

Most notably, refinements to the internal ratings-based (IRB) approach in the latest Basel proposals include a removal of the IRB approach for certain exposures (e.g.

to financial institutions, large corporates), the removal of the advanced IRB approach and hence the loss given default (LGD) estimation for a larger number of corporates (i.e. those with revenues over €200 million), and a 10% LGD floor for mortgages and the replacement of existing credit risk floors either with an aggregate output floor in a range of 60-90% or by applying output floors at a more granular level. In addition,

proposed revisions to the standardised approach for credit risk could also lead to some increase in capital requirements depending on the design and calibration of capital floors under this approach.

Bank capital requirements will also be determined by the EU’s Supervisory Review and Evaluation Process (SREP). In 2015 the SREP was, for the first time, conducted according to a harmonised methodology. As a result of the SREP, the average Pillar 2 requirements for significant institutions increased by 30 basis points from 2015 to 2016. In addition, the phasing-in of systemic buffers led to an average 20 basis point increase in overall capital requirements. Looking ahead, the outcome of the 2016 euro area and EU-wide stress tests will feed into the 2016 SREP.

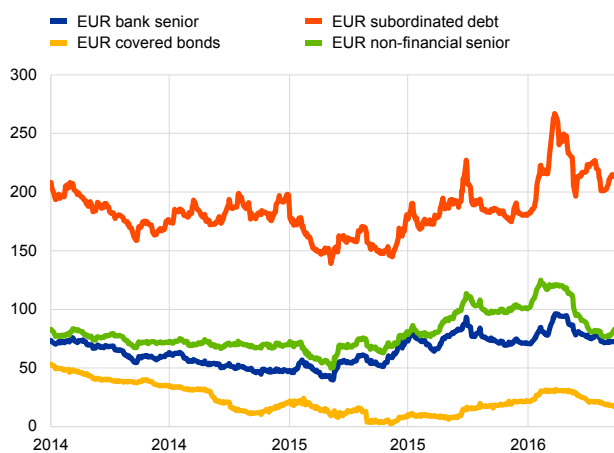
Bank funding markets affected by heightened volatility

Chart 3.22

Bank debt spreads widened during the market turmoil in early 2016, but they have tightened since March

Spreads on banks’ senior debt, subordinated debt and covered bonds and non-financial senior debt

(Jan. 2014 – May 2016; basis points)



Sources: ECB and Markit.

Bank funding markets have been adversely affected by the heightened volatility in financial markets in the early months of 2016. Bank subordinated and hybrid debt markets, including the market for contingent convertible capital instruments (see **Chart 5** of the Overview), have been particularly affected by the turmoil. Spreads on senior bank debt also moved higher, mirroring developments in non-financial senior spreads, while the covered bond market proved rather resilient (see **Chart 3.22**).

Funding conditions improved following the announcement of ECB measures in March, with both senior and covered bond spreads tightening back close to levels observed before the early 2016 episode of market turbulence.

These strains in the riskier segments of the bank debt market may have reflected uncertainty among investors regarding the application of bail-in rules as well as the higher perceived risk of missed coupon payments in AT1 markets. During the market

turmoil, developments in credit and equity markets

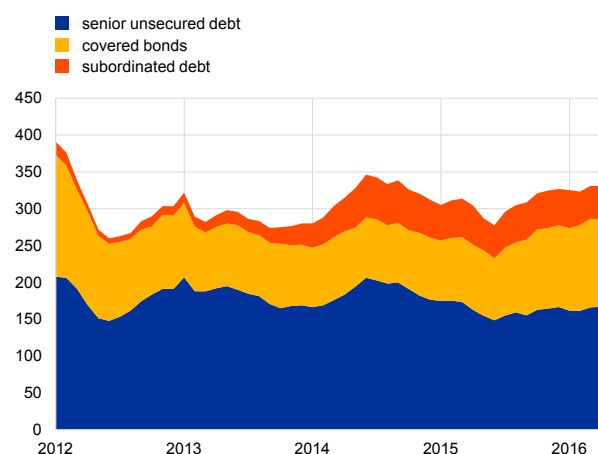
appeared to have become self-reinforcing. Market intelligence suggests that credit investors feared that equity valuations were too low to support rights issues, while equity investors were concerned that the turbulence in credit markets would, through higher funding costs, negatively impact future bank profitability. At the same time, the reversal of senior spread widening suggests there are no generalised concerns among credit investors about banks’ fundamentals and new ECB measures also helped dispel concerns about systemic risks in the banking sector.

Chart 3.23

Bank debt issuance shifted further towards secured debt, while subordinated debt issuance dropped somewhat

Gross issuance of medium and long-term debt by euro area banks

(Jan. 2012 – Apr. 2016; EUR billions)



Source: Dealogic.

Note: Excludes retained issuance and government-guaranteed debt.

The market turmoil in early 2016 also affected bank debt issuance activity temporarily, although it has picked up somewhat since March. Debt issuance patterns mirrored developments in secondary market spreads, with a shift towards covered bond issuance and a drop in subordinated debt issuance (see **Chart 3.23**). After a temporary market closure in February, the issuance of subordinated and AT1 debt resumed in March, reflecting the generally improved conditions in bank funding markets.

Meanwhile, banks continued to make progress towards meeting the new Basel III requirements on stable funding and liquidity buffers. According to the EBA's latest Basel III monitoring report, at the end of June 2015 more than three-quarters of banks subject to the monitoring exercise had already met the required minimum net stable funding ratio (NSFR) of 100%, with average NSFRs of 104% and 111% for the large, internationally active EU banks (Group 1 banks) and other EU banks (Group 2 banks), respectively.

Regarding progress towards meeting new liquidity

requirements, close to 80% of participating banks had a liquidity coverage ratio (LCR) above 100% at the end of June 2015, while the average LCR of Group 1 and Group 2 banks stood at 121% and 157% respectively.

3.1.2 Euro area insurance sector: an evolving business mix and investment allocation amid challenges from a low-yield environment

The current macroeconomic operating environment of persistent low interest rates paired with moderate economic growth poses the greatest challenge to euro area insurers' profitability. The resulting low-yield environment is dampening insurers' profitability and possibly eroding capital positions, particularly for life insurers offering products with long-term guaranteed rates and big duration mismatches between assets and liabilities. Reducing the duration gap is more easily achievable on new business as a reduction of the risk on existing business is increasingly challenging, the longer low returns persist. Large euro area life insurers have been successful in growing the sales of unit-linked or alternative products in the last years. This notwithstanding, these products are more complex to both manage and sell, making it harder for smaller players to rapidly change their business mix while maintaining the same level of sales.

The non-life and reinsurance sectors also face significant challenges. As non-life insurers' investments usually have a shorter maturity than those of life insurers, current investment returns decline more rapidly when interest rates fall. Furthermore, non-life insurers cannot share investment losses with policyholders. Given the weight

of fixed income securities and loans in non-life insurers' investments, cost-cutting and underwriting discipline continue to be pivotal to support the performance of the sector. In the reinsurance sector, abundant capacity and decreasing demand have sustained pressure on pricing and the erosion of terms and conditions.

In addition, insurers are gradually changing their asset allocation to boost yields. Insurers' increasing exposures to illiquid assets and higher-yielding (but lower-quality) fixed income securities could potentially result in a deterioration of overall asset quality and affect their economic capitalisation in the long term. On the other hand, changes in the investment portfolio reduce concentration risks, while diversification and investment expertise can limit to some extent the incremental average credit risk.

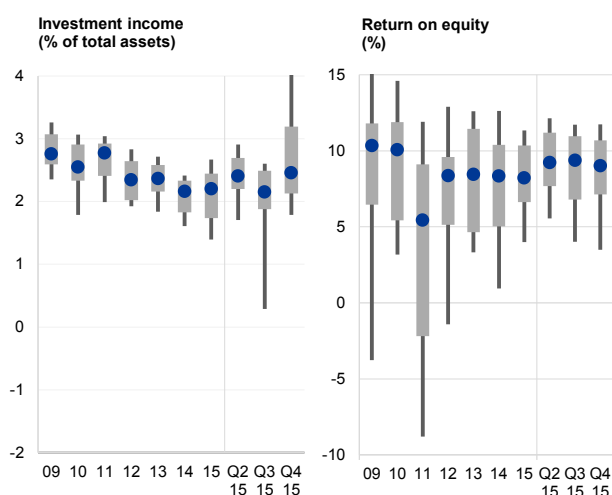
Financial condition of large insurers²⁸

Chart 3.24

Investment income bounced back in the last quarter of 2015, supported by realised gains in financial markets

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

(2009 – Q4 2015; percentages; 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.

The performance of large euro area insurers

remained stable despite a challenging operating environment.

Overall, the sector continued to exhibit robust profitability (see **Chart 3.24**), while growth in premiums written was volatile for both life and non-life globally active euro area insurers (see **Chart 3.25**).

Investment returns of large euro area insurers bounced back in the last quarter of 2015, supported by realised gains on their strongly valued fixed income portfolios.

On the life side, a more stable economic environment in the euro area has helped cushion some of the other headwinds that the sector faces, as it has reduced uncertainty with respect to disposable incomes and saving rates, thereby facilitating life insurance purchases and reducing the risk of policy surrenders.

The decline in traditional guaranteed products has been offset by the strong growth of unit-linked products in many countries. The latter products, where the return is linked to the performance of financial markets, have been able to offer attractive returns to customers in 2015 thanks to the recovery in global financial markets, despite producing more volatility in premium growth. On

the non-life side, real premium growth is now slowing

due to increased competition, but combined ratios (i.e. incurred losses and expenses as a proportion of premiums earned) are at a four-year low – comfortably below 100% – favoured by benign loss developments in recent years, implying that the sector is still profitable (see **Chart 3.26**).

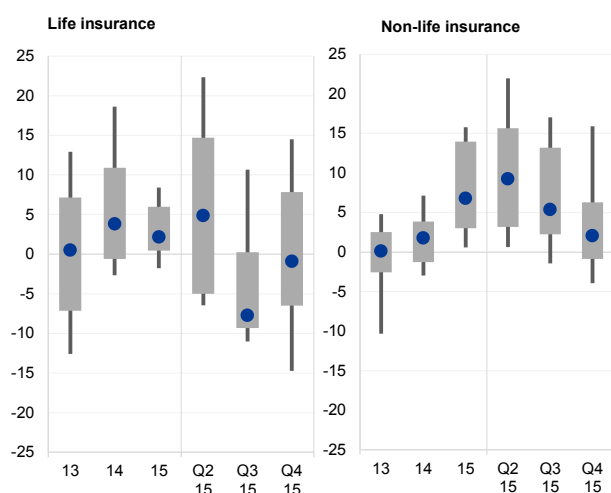
²⁸ The analysis is based on a varying sample of 24 listed insurers and reinsurers with total combined assets of about €5.1 trillion in 2015, which represent around 73% of the assets in the euro area insurance sector. Quarterly data were only available for a sub-sample of these insurers.

Chart 3.25

Underwriting business more volatile due to increased competition and changes in the business mix

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

(2013 – Q4 2015; percentages; 10th and 90th percentiles, interquartile distribution and median)



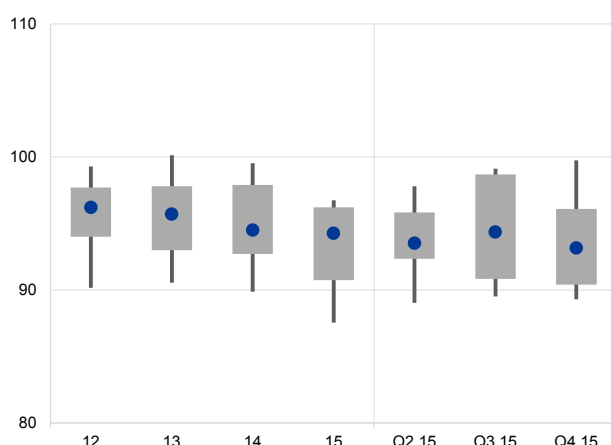
Sources: Bloomberg, individual institutions' financial reports and ECB calculations.

Chart 3.26

The cost side of non-life business reflects the benign loss developments

Combined ratio for a sample of large euro area insurers

(2012 – Q4 2015; percentages; 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.

Large euro area insurers' capital positions remain stable at comfortable levels

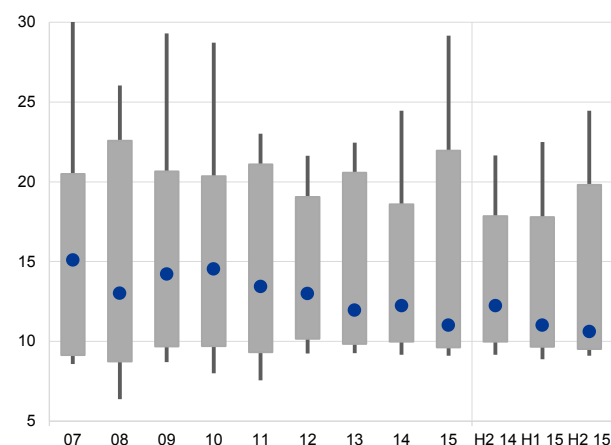
(see Chart 3.27). As part of the preparations for the market-based Solvency II regime that came into force in January 2016, insurers had been taking actions to improve their solvency positions in recent years, notably by extending the duration of their assets and accumulating specific reserves on their balance sheet as well as changing their product mix towards less capital-intensive products. Solvency II strengthens insurers' risk management and introduces further harmonisation at the European level, thereby promoting a level playing field for all insurance companies in Europe. However, some concerns remain among market participants about the complex nature of economic capital models, and the consistency with which the regime will be implemented across jurisdictions. In particular, uncertainty still prevails as regards the supervisory approval of internal models and the use of transitional measures, thereby impacting the "new" Solvency II capital positions.

Chart 3.27

Solid and stable capital base of euro area global insurers

Capital distribution for a sample of large euro area insurers

(2007 – H2 2015; percentages 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.

Insurance sector outlook: market indicators and analysts' views

Market-based indicators suggest a more challenging outlook going forward.

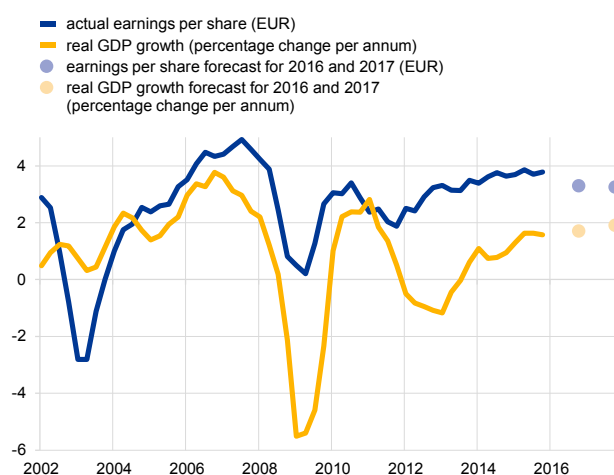
Profitability prospects suggest a declining trend in the coming years when the effect of low interest rates is expected to reduce investment income in particular (see [Chart 3.28](#)). Analysts continue to see non-diversified, small or medium-sized life insurers in countries with limited availability to lower the high policyholder guarantees extended in the past and that exhibit big duration mismatches between assets and liabilities being particularly under pressure in the future. Concerns about future profitability prospects are consistent with recent volatile developments in insurers' credit default swap (CDS) spreads (see [Chart 3.29](#)).

Chart 3.28

Analysts expect stagnant profitability for euro area insurers

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

(Q1 2002 – 2017)



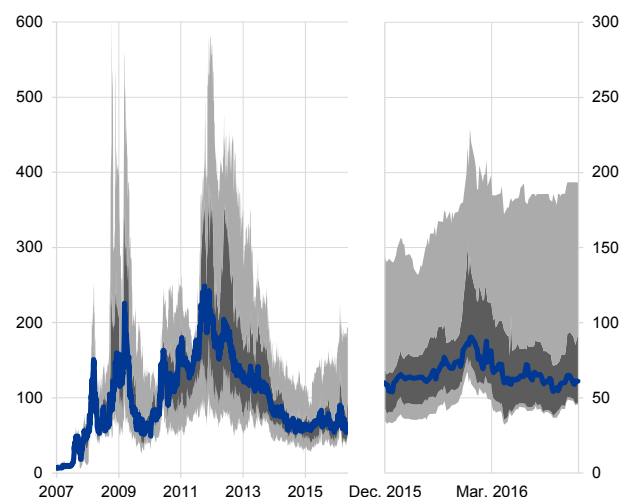
Sources: ECB, Thomson Reuters Datastream and ECB calculations.

Chart 3.29

Volatility in credit default swaps shows increased concerns about credit risk

CDS spread for a sample of large euro area insurers

(3 Jan. 2007 – 13 May 2016; basis points; senior debt, five-year maturity)



Sources: Thomson Reuters Datastream, Bloomberg and ECB calculations.
Note: The shaded areas indicate the minimum/maximum and interquartile ranges across the CDS spreads of selected large euro area insurers.

Analysts note that a further deterioration in credit and equity markets could result in a number of potential issues impacting capital.

These could come in the form of credit migration, credit defaults and equity impairments. Widening credit spreads, while not a major problem per se²⁹, have the potential to increase the likelihood of rating migration and credit defaults. If seen to a major extent, these issues could hit capital materially as they increase the denominator of the Solvency II ratio (i.e. capital requirements) and decrease the numerator (i.e. available capital). In such a scenario, Solvency II ratios could decline faster than the rates suggested in reported sensitivities, as the latter tend to only reflect spread movements.

²⁹ Under Solvency II, long-term guarantee measures have been introduced to offset an excessive volatility in the balance sheet following the market-consistent valuation approach. These measures allow for adjustments (under well-specified circumstances set out in the legislation) of the discount rate, which results only in a partial offset of credit spread movements.

Analysts expect sales of traditional life insurance products to continue declining sharply in the coming year.

That said, demographic trends and better economic prospects in the euro area are expected to foster an increase in European households' long-term savings, which would imply strong growth in sales of unit-linked and other capital-light products. For non-life insurance, analysts expect cost-cutting and a focus on efficient pricing to make it possible for insurers to continue weathering the headwinds caused by increased competition and low investment returns.

In the reinsurance sub-sector, analysts expect overcapacity, declining demand and non-abating alternative capital³⁰ to continue reducing underwriting margins at a time when the companies' investment returns remain low. This, coupled with limited natural catastrophe risks, has resulted in a continued softening of reinsurance rates at the 2016 renewals. Market experts expect these trends to continue over the short to medium term, in the absence of significant deteriorations in underwriting loss ratios.

In the long term, analysts expect digitalisation to reshape the distribution of insurance products. Insurers are focusing on IT and digitalisation as a means to boost client loyalty and support the client relationships of their agents. An additional benefit of digitalisation is that once processing is automated, product distribution will be cheaper and there will potentially be more economies of scale. For life insurance, this will allow the marketing of platforms where policyholders can keep track of their savings. At the same time, digitalisation will also present challenges for insurers. It may require larger-scale investments in IT systems, and the increased IT system complexity could lead to materially higher execution and operational risks. Similar to other financial institutions, cyber security is also a growing concern for insurers in the light of their increased vulnerability, via digital channels, to the theft of or attack on customers' personal data.

Investment portfolios accelerate the adjustment to the low-yield environment

Euro area insurers remain predominantly invested in government and corporate bonds (see Chart 3.30). Hence, insurance companies are especially vulnerable to a prolonged period of low interest rates, during which investment returns usually decline. This scenario is particularly challenging for life insurers that have offered long-term guaranteed rates in the past as investment returns may fall below the offered guaranteed rate and the yield at which maturing assets can be reinvested is lower. These companies face a higher risk of losses, which has the potential to hamper profitability and affect solvency positions in the long run. Hence, the risk of protracted low interest rates is a key risk for life insurers. Interest rate

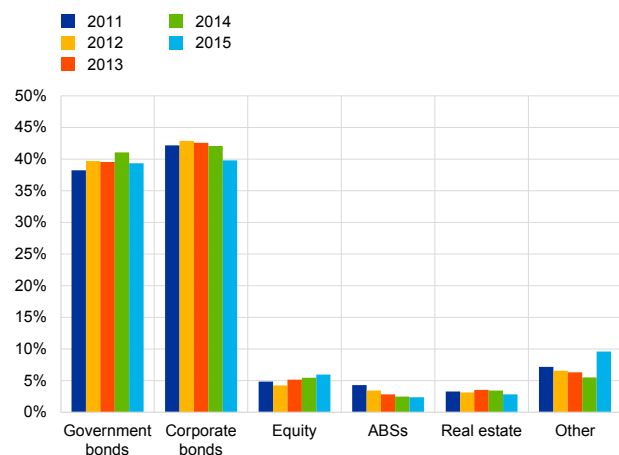
³⁰ Alternative capital is typically accessed through securitised instruments (such as catastrophe bonds), private deals between an investor and a primary carrier (such as collateralised reinsurance) or "sidecars" (through which capital markets co-invest their capital alongside reinsurance capital). Alternative capital accounted for 19% of the global catastrophe limit in 2015, according to Guy Carpenter.

Chart 3.30

Euro area insurers remain predominantly invested in fixed income securities

Investment portfolio split of selected euro area insurers

(2011-15; percentages of total investments; weighted averages)



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

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

sensitivity differs from company to company depending on a combination of the (i) business mix, (ii) average guaranteed rate, (iii) ability to lower the offered rate and (iv) asset/liability duration gap. Low rates prompt insurers to adapt their business model (with changes on both the assets and liabilities side). Even though overall fixed income instruments clearly dominate euro area insurers' investment portfolios, exposure to government and corporate bonds has slightly decreased in 2015. This was offset by increases in equities and the "other investment" category, mostly related to an increase in investments in illiquid assets such as lending and infrastructure. This search for yield, as insurers need to roll over investments in the low-yield environment, is expected to continue in the coming years, intensified also by regulatory pressures in some jurisdictions. While this shift in asset allocations intrinsically brings diversification benefits, it also warrants close monitoring from supervisory authorities as it also brings increased illiquidity and credit risks.

Data from and reports by individual insurers confirm the re-risking of investment portfolios.

In an attempt to boost reinvestment returns, the shift within the fixed income portfolio away from AAA-rated bonds towards higher-yielding bonds³¹ and away from low-yielding euro area sovereign debt has continued (see **Chart 3.31** and **Chart 3.32**), combined with reported increases in asset duration. Given the amount of BBB-rated bonds in euro area insurers' portfolios and the volatility in credit markets, rating migration could become an issue in the future. A one-notch downgrade of a BBB corporate bond to non-investment grade reduces the available operating capital and increases the required solvency capital charge, potentially hurting the solvency ratio significantly in the event of mass rating migration. One unintended consequence of rating migration could be the forced selling of investment assets at market value.³² While it is currently unclear whether under transitional measures insurers will be able to adjust their asset allocation for this purpose, rating migrations could become an issue in the medium to long term and could add to insurers' procyclicality, posing potential financial stability risks, especially if aligned actions take place simultaneously, given the systemic importance of the euro area insurance sector.

³¹ Rating downgrades have probably also contributed to the mentioned shift.

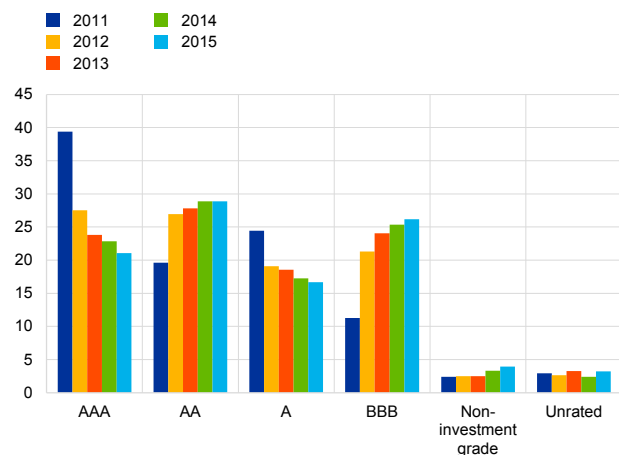
³² Under Solvency II, in matching adjustment portfolios there are restrictions on the percentage of total assets that can be BBB or below. Hence, an insurer might be forced to sell those assets (if it breaches the matching adjustment limits) and realise mark-to-market losses, as it is not allowed to hold the assets until maturity.

Chart 3.31

Exposures to higher-yielding bonds continue to increase...

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

(2011-15; percentage of total investment portfolio; weighted averages)



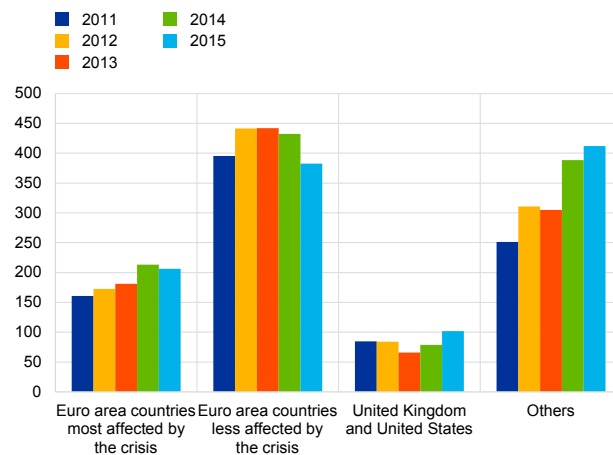
Sources: JPMorgan Cazenove, individual institutions' financial reports and ECB calculations.
Note: Based on available data for 15 large euro area insurers and reinsurers.

Chart 3.32

... while sovereign exposures remain high, with decreases in low-yielding euro area sovereign bonds

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

(2011-15; 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 split of euro area countries into the two different groups is done according to euro area countries that have experienced a significant deterioration in their long-term credit rating since the onset of the financial crisis. Based on available data for 15 large euro area insurers and reinsurers.

Current exposures of euro area insurers to emerging markets and the oil and energy sectors are limited and do not give rise to great concern for most insurers despite the strengthening of headwinds emanating from these markets. Concerns about exposure to emerging markets relate mainly to the earnings side for some individual firms rather than balance sheet exposure, as sovereign risk is not in focus at the moment and emerging market bond holdings remain at the same levels as in the previous year. Exposure to energy bonds on insurers' balance sheets has also been a concern given the recent decline in oil and energy prices. While exposures differ at a company level, most large euro area insurers have a limited share (5-7%) of energy-related bonds in their corporate bond portfolio and should not face any material impact if energy prices stay at current levels.

Life insurance: new business focused on unit-linked and alternative products

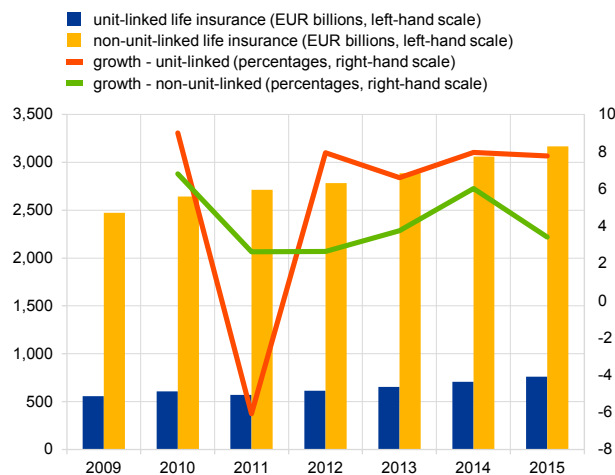
Traditional life insurance savings products have historically accounted for the bulk of life insurers' sales in many euro area countries, heavily exposing life

insurance companies to interest rate risk.³³ The prolonged period of low interest rates makes it increasingly challenging for insurers to generate investment returns above the average guaranteed rate on existing business, while the current risk-free interest rates are low compared with the guaranteed rate on new business. As a result, some life insurers – particularly in those jurisdictions where such guarantees are rigid and have been set at high levels in the past – are gradually adjusting their business models towards less capital-intensive and fee-based operations aimed at reducing their exposure towards the low-yield environment. This is being achieved by discontinuing the sales of traditional guaranteed policies and offering unit-linked policies, where all investment risks are borne by policyholders, or alternative savings products which combine a guaranteed component (but most of the time only at the maturity of the policy and not on a yearly basis) and a unit-linked component.

Chart 3.33
Growth momentum maintained for unit-linked life insurance

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

(2009-15; percentages; EUR billions)



Source: ECB data for balance sheets of insurance corporations and pension funds.
Note: Data for insurance corporations and pension funds are collected taking a short-term approach and are not fully harmonised.

These alternative products are less risky for insurers and the increasing weight of these products in insurers' balance sheets will diminish insurers' interest rate risk. However, insurers which have decided to replace traditional products with new products transferring more risks to policyholders will likely sell less products overall as these products are less attractive for risk-averse policyholders and may face competition from savings products offered by other financial institutions. At the euro area aggregate level, unit-linked insurance accounts for around 20% of life insurance policies, while the pace of growth remains high (see **Chart 3.33**). However, these numbers mask considerable heterogeneity across countries; in some countries, new business is completely in unit-linked policies and new traditional life policies are not offered any more.

Nonetheless, the positive effect of changes in new business on insurers' balance sheets will be modest for some time. New business typically represents only around a single-digit percentage of the

existing insurance liabilities in any one year, hence existing policies still determine insurers' underwriting profitability. Alongside unit-linked products, some life insurers also plan to focus on term life insurance. However, this also represents a small proportion of their portfolio. Therefore, the financial strength of life insurers will remain under pressure in this low interest rate environment.

³³ Traditional life insurance products offer a yearly guarantee for a long duration. For instance, these products represented about 83% of German life insurers' net reserves as at year-end 2013 and still around 73% of new business premiums in 2014.

Other activity: competition set to affect the non-life market and challenges for reinsurance

In non-life insurance, challenges arise mainly from retail business, in particular motor insurance, in the main euro area countries. Pressures on investment margins support underwriting discipline throughout the sector. The motor insurance segment, which represents a significant proportion of the total non-life sector, faces industry-wide pressures. In the short term, intense competition and higher expected claims³⁴ are likely to continue to constrain profitability. In the longer term, the sector may benefit from the use of telematics data³⁵, which help in more accurately pricing the risk of a driver, but the sector faces several challenges that might reshape it completely, e.g. the arrival of driverless cars.

The reinsurance industry is feeling pricing pressure, partially fuelled by a low catastrophe loss experience. Total insured losses amounted to USD 27 billion across the industry in 2015, well below the ten-year historical average of USD 56 billion. As a consequence, the 2016 renewal rounds saw a decline in reinsurance premium rates, which fell for a fourth consecutive year (see [Chart 3.34](#)). Furthermore, there is abundant reinsurance capacity in traditional reinsurers and from alternative capital sources, increasing competition throughout the reinsurance sector, in particular within the casualty segment³⁶ and speciality lines given current segment profits and the desire to diversify into non-catastrophe lines. In addition, the sector faces stagnant or declining demand for reinsurance as insurance companies are retaining more risk and centralising reinsurance purchasing. On the other hand, the implementation of Solvency II has created some added reinsurance demand for capital relief. Despite the challenging operating environment, large euro area reinsurers' profitability and capital levels remain at comfortable levels, supported by the fact that underwriting results were further assisted by the better than expected prior-year loss.

Year-end catastrophe bond issuance declined for the first time since 2011, but remains strong at around USD 6 billion. The outstanding amounts of maturing bonds in the market stayed slightly below 2014 levels at USD 22.4 billion (see [Chart 3.34](#)). Investor appetite in this sector remains high given its good return profile and the uncorrelated nature of catastrophe bonds, which have weathered the recent market volatility better than other asset classes (see [Chart 3.35](#)). While a functioning catastrophe bond market contributes to diversification of investors' portfolios, it also strengthens the links between the reinsurance sector and the financial markets, making the sector vulnerable to procyclical behaviour by investors.

³⁴ Increased economic activity, combined with lower oil prices, typically increases the frequency of claims, following an increase in the use of private cars.

³⁵ Telematics motor insurance uses a device fixed in the customer's vehicle to track driving statistics, e.g. mileage and braking habits. The insurer then links the customer's premium rate to these statistics.

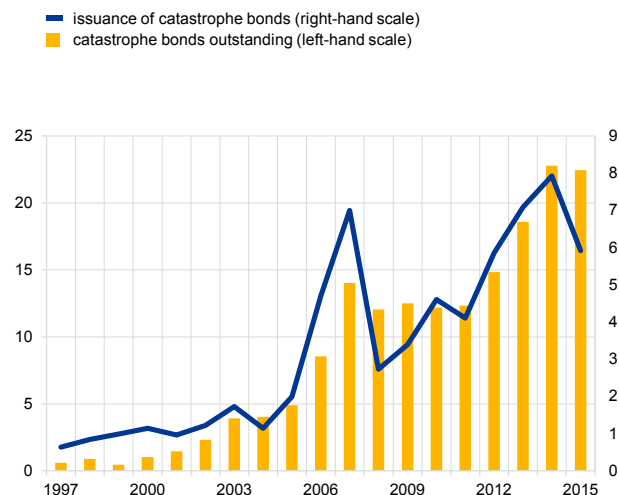
³⁶ In some cases, cyber risk is being added to casualty coverage.

Chart 3.34

Issuance of catastrophe bonds slightly below all-time high in 2014

Catastrophe bond issuance and amounts outstanding

(1997 – 2015; EUR billions)



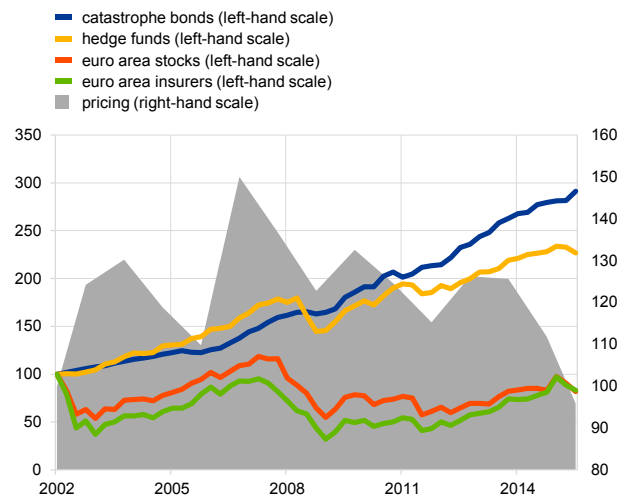
Source: Guy Carpenter.

Chart 3.35

Reinsurance premium rates continue to fall, while the uncorrelated nature of catastrophe bonds is confirmed

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

(Q1 2002 – Q4 2015; index: Q1 2002 = 100)



Sources: Bloomberg, Guy Carpenter and ECB calculations.
Notes: The series for pricing ends in Q4 2015. S&P 500 and EURO STOXX are used as benchmark indices for US and euro area stocks respectively. The Guy Carpenter World Property Catastrophe RoL Index tracks changes in property catastrophe reinsurance premium rates on a worldwide basis.

3.1.3 A stalling of investment fund activity slows the rapid expansion of the non-bank sector

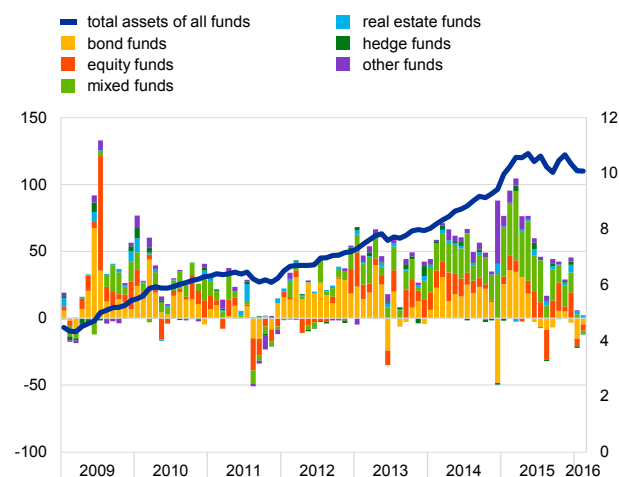
Growth in the investment fund sector, underpinning much of the expansion of the non-bank sector over the last years, stalled during the second half of 2015 amid a decline in asset prices and a partial reversal of net flows. Exposures have been building up over the past few years amid falling interest rates, with an intermittent slowdown during the euro area sovereign debt crisis. Total assets of funds domiciled in the euro area have more than doubled since 2008, partly owing to asset valuation effects. The large and growing exposures of euro area investment funds over the past decade have spurred concerns that the potential for this sector to amplify market-wide shocks has increased. The most recent period of global asset repricing has resulted in net outflows across all types of funds, except real estate funds (see [Chart 3.36](#)). The reversal of fund flows was caused predominantly by outflows for non-euro area investors, whereas flows from the euro area stayed positive on a net basis. While the funds were generally able to cope with more volatile flows, the concern is that the sector is vulnerable to broad-based redemptions under more extreme market scenarios.

Chart 3.36

Growth in euro area investment funds has stalled, amid a decline in asset prices and a partial reversal of flows

Monthly net flows by type of fund and total assets

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



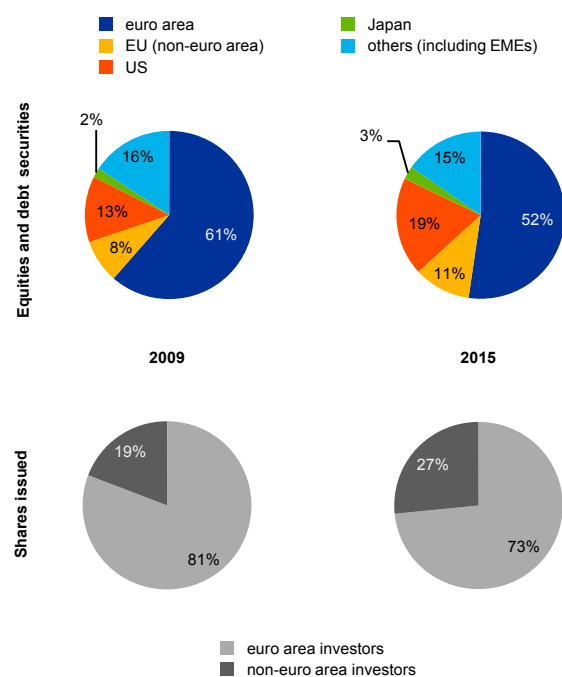
Sources: ECB and ECB calculations.

Chart 3.38

Cross-border exposures as well as investments by non-euro area residents have expanded up until recently

Selected assets and liabilities of euro area investment funds by regional counterpart

(Q4 2009; Q4 2015)



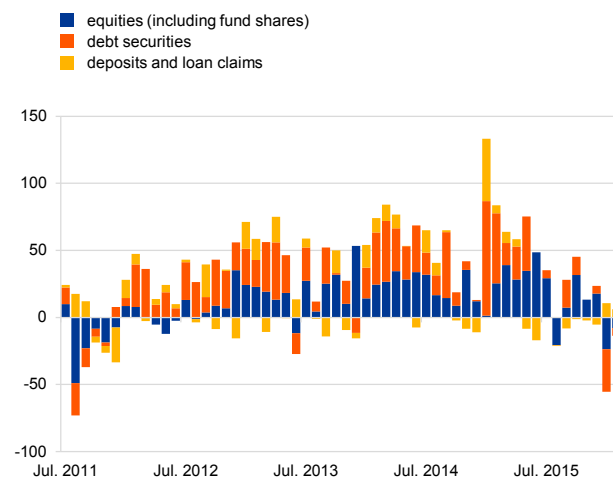
Sources: ECB and ECB calculations.
Note: Equities include investment fund shares.

Chart 3.37

Substantial net divestments at the beginning of the year

Monthly net purchases by euro area investment funds

(July 2011 – Feb. 2016; net transactions in EUR billions)



Sources: ECB and ECB calculations.

In this context, concerns have surfaced that substantial divestments by funds can amplify market-wide shocks, especially if liquidity conditions in secondary markets are weak. The recent market turmoil resulted in substantial net divestments of euro area investment funds, where the funds sold €32 billion of debt securities and €24 billion of equities including fund shares during the month of January alone (see [Chart 3.37](#)). Net divestments in January 2016 were about double the level seen in the US “taper tantrum” in June 2013. They may have contributed to the general deterioration in liquidity conditions in some emerging market and high-yield segments. Net sales were smaller and less persistent than at the height of the euro crisis in 2011 however.

With the global risk outlook changing, a large investment fund sector is an important channel for inward and outward euro area spillovers related to cross-border portfolio investments. A significant amount of euro area fund shares are held by non-euro area investors (27% of shares issued), yet an even higher share of the funds’ portfolios is held in non-euro area equities and debt securities (around 48% of total securities held; see [Chart 3.38](#)). These cross-border exposures have grown significantly since 2009, leaving the euro area fund sector more exposed to

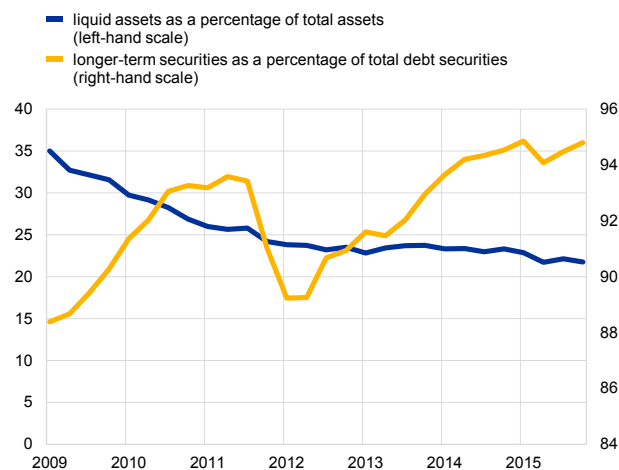
developments in global markets. While a change in global risk perception can easily trigger outflows from euro area funds, a shift in euro area sentiment can adversely affect markets abroad. In terms of country allocation, the share of debt and equity securities invested outside the main industrial countries, including the United States, Japan and the rest of the EU, ranges from 8% for mixed funds, through 13% for bond funds, to 20% for equity funds. These investments include exposures to emerging markets which had previously increased, but have been reduced during the third quarter of 2015 and at the beginning of 2016 in the light of elevated market volatility in some emerging market and high-yield segments.

Chart 3.39

Risks from liquidity and maturity transformation of euro area bond funds are growing

Share of liquid assets and longer-term debt securities

(Q1 2009 – Q4 2015; percentages)



Sources: ECB and ECB calculations.

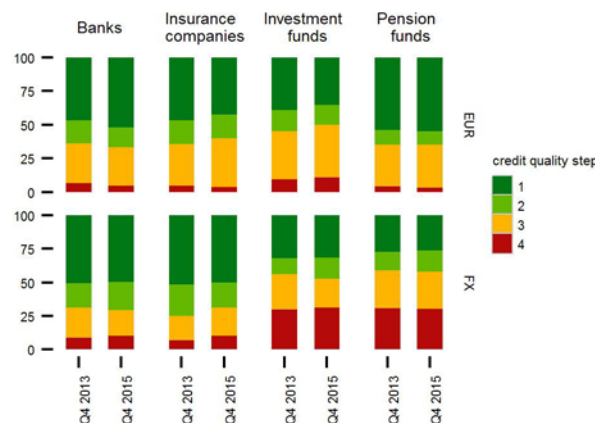
Notes: Liquid assets include euro area government bonds, deposits and loan claims with MFIs. Longer-term securities include bonds with an initial maturity above two years.

Chart 3.40

Investment funds have shifted their holdings from higher to lower-rated debt securities

Euro area financial institutions' debt securities holdings by rating category, sector and currency

(Q4 2013; Q4 2015; percentages of total holdings)



Sources: ECB 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.

Liquidity and maturity transformation continues to grow among bond funds amid these changing sector-wide investment patterns.

While the bond fund sector faces higher liquidity and maturity mismatches, redemption profiles of most funds have remained unchanged. Balance sheet indicators point to a decrease in the most liquid positions of bond funds since 2009, while the share of longer-dated securities has been growing since 2012 (see **Chart 3.39**). Liquidity and maturity transformation has increased as a result, which leaves bond funds exposed to future market-moving events, regardless of whether they invest predominantly in high-yield or investment-grade securities. In the current market environment, where periods of high risk tolerance alternate with periods of low risk tolerance, rent-seeking seems all the more attractive if positions can be unwound upon the first signs of distress. Open-ended bond funds seemingly offer investors the possibility to engage in less-

liquid markets, while being able to quickly respond to market-moving events, such as by selling investment fund shares. On the downside, investors' overall demand for liquidity can suddenly rise in a market downturn, thus contributing to a decline in secondary market liquidity when it is needed most.

Increased risk-taking over the past years has implied a heightened sensitivity to a prospective simultaneous reversal in risk premia and fund flows. A common pattern observed across the sector during the past two years is that investment funds have shifted their asset allocation from higher to lower-rated debt securities (see [Chart 3.40](#)). The overall shifts in portfolio composition have largely been driven by an actual reduction in the holdings of higher-rated securities and an increase in lower-rated securities, rather than by a decline in the rating quality of securities held.³⁷ Investors appear to hold a higher share of the lowest-rated securities when these are non-euro-denominated. In addition, the average residual maturities have increased by almost one year. Comparing across types of institutions, this pattern of allocation is particularly pronounced for the investment and pension fund sectors which, coincidentally, are the two sectors with the highest relative exposure to foreign currency-denominated securities. Likewise, market betas estimated from bond fund returns point to an effective increase in risk-taking. While

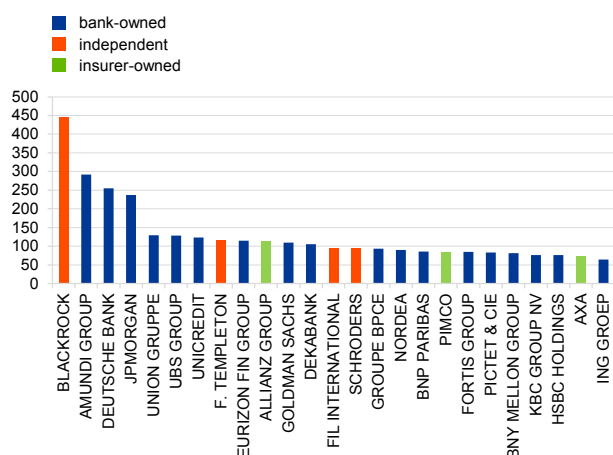
return sensitivities to the investment-grade segment have somewhat declined since 2012, sensitivities to the high-yield segment markedly increased until August 2014, matching the observed shift in portfolio composition (see also [Chart 9](#) in the Overview). Market betas for the high-yield segment have come down in the past year. However, they remain at elevated levels compared with the period before 2014. Moreover, the dispersion of market betas has widened, with funds in the upper 25th percentile bearing significantly more market risk than before.

As bank ownership is prevalent among the largest asset management companies in the euro area, there are concerns about step-in risk and contractual obligations of bank parent companies. Possible channels for contagion result from step-in risk, credit lines and contingency arrangements between banks, their asset management arms and the investment funds that they manage. In particular euro area banks, and to a lesser extent insurers, have significant control over the euro area investment fund sector. In the sample³⁸, 52% (66 out of 127, accounting

Chart 3.41
Bank ownership dominates among the large asset management companies in the euro area

Aggregate net assets of euro area funds managed by the top-25 management company parents and sector ownership

(Q3 2015; total net assets in EUR billions)



Sources: Lipper IM and ECB calculations.

Notes: Asset managers are classified as held by banks/insurers when the asset manager is a subsidiary of the bank/insurer (this excludes cases where bank/insurance activities are a subordinate business of the group or where the holding company also holds banks/insurers) or has a bank/insurer as a majority shareholder.

³⁷ Robustness checks considered rating changes for the securities held throughout the period under consideration, as well as the ratings of securities that had left or newly entered the dataset. This information was used to assess the impact of rating changes on the results presented, which was marginal.

³⁸ The Lipper IM data cover 50% of the euro area investment fund population and around 62% of assets managed by euro area investment funds.

for 60% of total net assets) of euro area investment fund sponsors are either banks or owned by banks, while 16% (20 out of 127, accounting for 12% of total net assets) are either insurers or owned by an insurance company (see [Chart 3.41](#)).

Furthermore, bank and insurance ownership concentration increases with the size of asset managers. For example, within the group of the 25 largest asset managers, only four managers are not directly affiliated with a bank or insurer, while three out of those four of the remaining independent managers are domiciled in the United States. Such interconnectedness calls for an enhanced monitoring of potential systemic risks originating in or amplified by the investment fund sector, as well as of the contingent liabilities of banks which should be monitored at a country level given the geographical dispersion of investment fund ownership in the euro area.

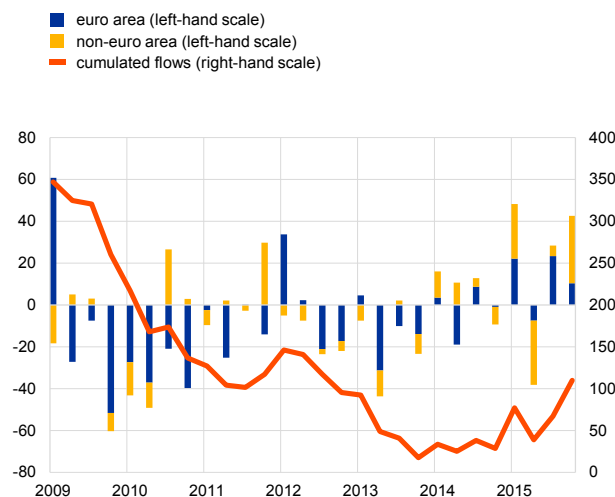
Following a prolonged period of contraction after the global financial crisis, the euro area money market fund (MMF) sector is growing again, amid the current negative rate environment (see [Chart 3.42](#)). Some MMFs have received large inflows from corporates in some northern euro area countries that face negative rates from their banks on overnight deposits, rendering fund investments more attractive in comparison. These corporates are partly shifting their cash balances, which they previously held either in constant net asset value (CNAV) funds or in overnight bank accounts, to variable net asset value (VNAV) money market funds. The need for cash around the month-end or quarter-end of these corporate investors has resulted in higher volatility of MMF flows around these dates.

Chart 3.42

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

Quarterly net flows into MMFs

(Q1 2009 – Q4 2015; net flows in EUR billions)



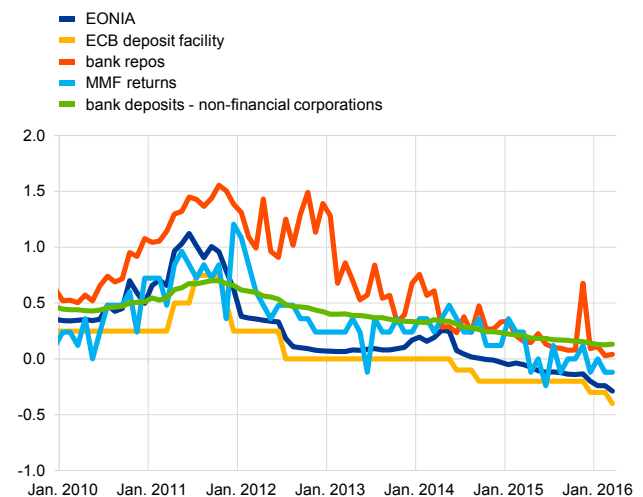
Sources: ECB and ECB calculations.

Chart 3.43

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

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

(Jan. 2012 – March 2016; percentages)



Sources: EPFR, ECB and ECB calculations.

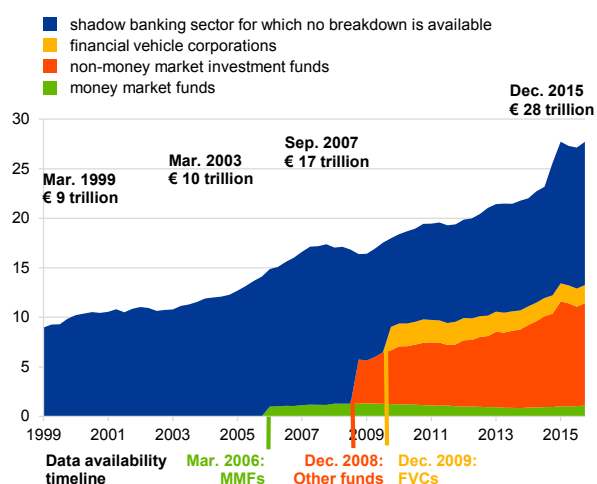
Notes: MMF returns are based on EPFR data for euro-denominated funds. Bank repo and deposit rates are based on the ECB MFI interest rate statistics using the narrowly defined effective rate.

Money market funds have also exhibited a tendency to adopt riskier investment strategies, as they compete with alternative cash-like investments.

In order to maintain returns above critical levels, relative to alternative cash or cash-like claims (see [Chart 3.43](#)), euro-denominated MMFs have an incentive to venture into higher-yielding assets and to take on more risk. Risk-taking is generally higher for VNAV funds than for funds which promise a constant net asset value (CNAV funds). However, such risk-taking is bound by regulatory limits regarding certain asset classes and duration exposures. Balance sheet data suggest that MMFs have recently increased their share of non-government paper, looking for potentially higher-yielding assets. MMFs are also inclined to engage more in maturity transformation within regulatory limits. Vulnerabilities may be building up over time, with a risk of unravelling once short-term rates start to rise again. Concerns over a sudden reversal of flows are not pressing at the current juncture in view of the continued accommodative monetary policies.

Chart 3.44
Shadow banking sector assets according to the broad measure have remained stable

(Q1 1999 – Q4 2015; 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.

As regards foreign currency-denominated MMFs, USD MMFs expanded faster than funds investing in the euro-denominated money market. Concerns are that a sudden shift in risk sentiment could lead to a shortage of USD funding for some weaker euro area banks. Near to medium-term risks for the banking sector appear to be limited, as the current low-yield environment should ensure stable funding conditions for the foreseeable future.

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. While it appears that the sector is growing in size, a significant proportion (up to two-thirds) of the residual shadow banking sector can be attributed to special financial institutions and holding companies, as well as other entities not engaged in shadow banking activities.³⁹ For the remainder, it cannot be excluded that those entities engage in risky liquidity transformation or credit intermediation. Meanwhile, growth in the broad shadow banking sector has not further accelerated mainly due

to the fact that growth in the non-money market investment fund sector has stalled (see [Chart 3.44](#)). While the MMF sector has seen a revival of net inflows over the past six months, the non-money market investment fund sector suffered both from a decline in asset values as well as a partial reversal of flows. Growth in euro area financial vehicle corporations has stabilised over the past year owing to somewhat stronger loan origination and securitisation activity by euro area credit institutions.

³⁹ With the statistics available at the euro area level, some shadow banking activities can indeed not be identified by type of entity. 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. Statistical reporting has recently been enhanced in some euro area jurisdictions.

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

This subsection 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 publication (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.⁴⁰ The presented results for the euro area banking groups are not comparable with the results of bottom-up supervisory exercises, such as the ongoing EBA bank stress-testing exercise. Such exercises are based on a more consistent and up-to-date dataset and internal bank risk models instead of top-down models. Moreover, the adverse scenario used for the EBA exercise encompasses several risk factors in contrast to the more targeted scenarios designed for this assessment.⁴¹ Due to the limited availability of disaggregated data on assets, liabilities, capital and profitability of financial institutions other than banks and insurers, this subsection 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 the shadow banking entities to the euro area banks and insurers.

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

Risk	Scenario	Key assumptions driving impact on GDP
Further increase of risk premia and financial turmoil, triggered by emerging market stress and persistently low commodity prices	Global risk aversion scenario	Shocks to risk aversion and investor confidence worldwide causing stock price declines, a widening of corporate bond spreads and lower euro area foreign demand
Weak profitability prospects for banks and insurers, with banks' intermediation additionally constrained by unresolved problems in reducing non-performing loans	Weak bank operating environment scenario	Shocks to private investment and consumption
Rising debt sustainability concerns in sovereign and non-financial private sectors amid heightened political uncertainty and low nominal growth	Sovereign and private sector debt crisis scenario	Renewed rise in sovereign bond yields to elevated levels and stock price declines
Prospective stress in the investment fund sector amplified by liquidity risks and spillovers to the broader financial system	Shadow banking spillover scenario	Reversal of the improvement in euro area bank funding conditions, leading to higher money market rates and a higher funding cost for the real economy

Source: ECB.

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 the shadow banks, as well as responses of other financial market parameters to these shocks. International spillovers of financial shocks are

⁴⁰ 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.

⁴¹ For a 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.

modelled using Bayesian VARs and a GVAR model⁴², while the impact of global developments outside the European Union on euro area foreign demand is assessed using NiGEM. The impact of the shocks on the euro area economies has been derived using stress-test elasticities (STEs).⁴³ The baseline scenario used in the assessment is derived from the European Commission's winter 2016 (February 2016) economic forecast.

The global risk aversion scenario reflects the risk of an abrupt reversal of investor confidence and risk aversion worldwide. This scenario would be triggered by simultaneous financial market turmoil in the main emerging markets, including in particular commodity producers, and a rapid increase in market uncertainty in the United States. The heightened market volatility and declining asset prices would push the prices of euro area financial assets down. Stock prices would fall by 27% and government bond yields would increase by 67 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 2.7% below the baseline level by the end of 2017.

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 shocks to private consumption and investment, as well as to oil prices. Overall, real euro area GDP would stand 1.7% below the baseline level by the end of 2017. Financial market parameters are assumed to evolve in line with the baseline projection in this scenario.

The sovereign and private sector debt crisis scenario envisages a renewed increase in euro area sovereign bond yields to elevated levels. Long-term government bond yields are assumed to increase by nearly 100 basis points above current market expectations, with a significant dispersion across euro area countries, 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 by 5%. In parallel, as concerns about the sustainability of debts of the private non-financial sector would rise, credit provision would be restricted by lenders. Total loans to the non-financial private sector would be reduced by about 5%, leading to a reduction in aggregate demand of the private sector. These developments would reduce euro area GDP by about 1.5% compared with the baseline by the end of 2017.

The shadow banking 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. An unexpected increase in

⁴² 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.

⁴³ 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. The STEs also incorporate intra-EU trade spillovers.

redemptions by investors in shadow banks would lead to forced sales, which would put lasting pressure on euro area asset prices.⁴⁴ 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 0.5% compared with the baseline level by the end of 2017. Bank long-term funding spreads would increase by about 50 basis points and short-term unsecured money market spreads would widen by 80 basis points.

Table 3.2

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

	2015	2016	2017	Q4 2017
Baseline (annual percentage growth rates)	1.6	1.7	1.9	
	<i>percentage point dev. from baseline growth</i>			<i>% dev. from baseline level</i>
Global risk aversion scenario		-1.4	-1.3	-2.7%
Weak bank operating environment scenario		-1.0	-0.7	-1.7%
Sovereign and private sector debt crisis scenario		-0.6	-0.9	-1.5%
Shadow banking spillover scenario		-0.2	-0.3	-0.5%

Sources: European Commission and ECB.

Looking at the severity of the different scenarios, the global risk aversion scenario would have the strongest impact on euro area economic activity (see **Table 3.2**). The materialisation of the first and second risks, identified as medium-level systemic risks, is considered more likely than the materialisation of the third and fourth risks, which are deemed potential systemic risks (see the Overview).

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	Sovereign and private sector debt crisis scenario	Shadow banking spillover scenario
Average euro area increase in short-term interest rates (basis points)	0	0	0	80
Average euro area increase in long-term government bond yields (basis points)	67	0	97	65
Shock to euro area real estate prices (%)	-2	-1	-3	0
Shock to euro area equity prices (%)	-27	0	-5	-14

Source: 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 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 sovereign and private sector debt crisis scenario exhibits a large dispersion across the individual euro area countries. Under the weak EU bank operating environment scenario, the yield curve would remain unchanged, while in the case of the shadow

⁴⁴ 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.

banking spillover scenario, a slight flattening would be associated with an upward shift of the curve.

Solvency results for euro area banking groups

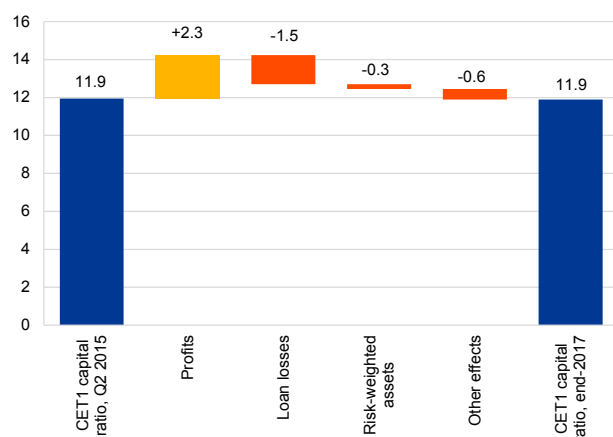
The impact of the four scenarios on bank solvency is broken down into the direct impact on the capital of individual banks, on the one hand, and the indirect effects stemming from cross-institutional contagion, on the other. The direct impact is obtained from a projection of the main variables that determine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

Chart 3.45

Under the baseline scenario, the euro area bank solvency position would remain unchanged

Average contribution of changes in profits, loan losses and risk-weighted assets to the CET1 capital ratios of euro area banking groups under the baseline scenario

(percentage of CET1 capital ratio and percentage point contributions)



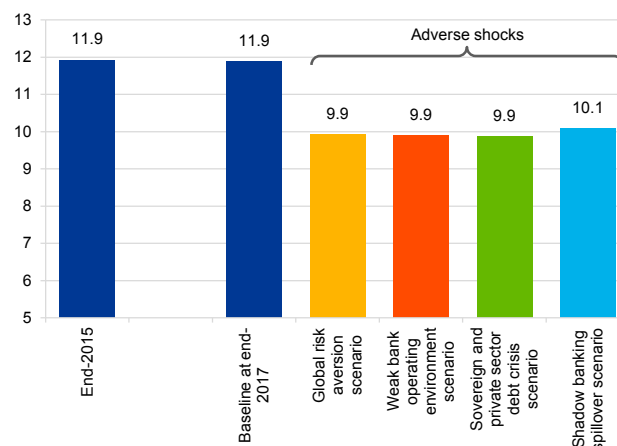
Sources: Individual institutions' financial reports, EBA, ECB and ECB calculations.

Chart 3.46

The adverse scenarios would reduce the aggregate capital ratio by around 2 percentage points

Average CET1 capital ratios of euro area banking groups under the baseline and adverse scenarios

(2015-17; percentages, average of euro area banking groups)



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

Under the baseline scenario, the capital position of the euro area banking groups is projected to stay constant. The aggregate common equity Tier 1 (CET1) capital ratio is projected to remain unchanged at about 11.9% at the end of 2017 (see [Chart 3.45](#)). While the operating profits of the euro area banking groups would be positive and exceed the increase in credit losses by about 0.8 percentage point, the concurrent increase in risk-weighted assets and other effects – related mainly to the gradual phasing-in of the requirements set out in the Capital Requirements Directive IV (CRD IV) – would offset the positive impact from the retention of earnings.

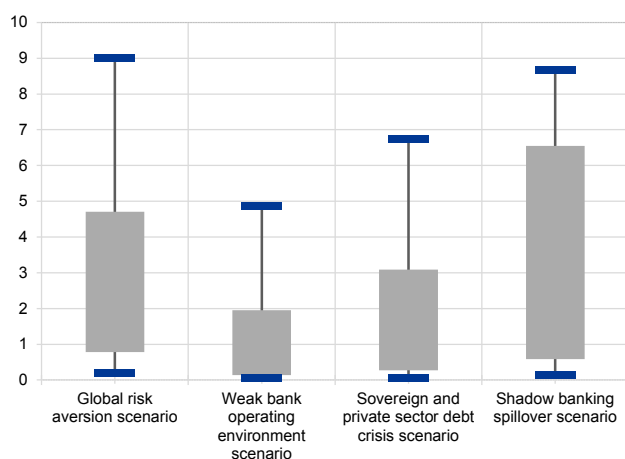
Three of the four scenarios would lead to a broadly similar impact on aggregate capital ratios. The shadow banking spillover scenario would have a slightly less severe impact on bank capital (see [Chart 3.46](#)). The limited variability in

the impact of the scenarios is, to some extent, driven by the significant contribution from other effects, mainly related – as under the baseline scenario – to the transition to the CRD IV capital regime. In addition, and despite the very different conceptual nature of the exercise presented here, the methodological assumptions of this assessment are largely consistent with the EBA’s EU-wide stress-test exercise, which implies that several items in the banks’ profit and loss accounts are projected using historical values.⁴⁵

Chart 3.47
Interbank contagion moderately increases total losses

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 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 1.0 and 1.7 percentage points compared with the baseline result. These provisions would be particularly high under the global risk aversion scenario, amounting to 3.2% of risk-weighted assets, as loan losses on direct lending to emerging market counterparties would increase.

Operating profits would improve under some of the adverse scenarios.

Driven mainly by higher interest income and on the back of higher lending spreads, the total contribution of operating profit to the change in capital ratios would increase to +2.7 percentage points under the global risk aversion scenario. Operating profits would also increase, although less markedly, under the shadow banking spillover scenario. Under the

remaining two adverse scenarios, operating profits would slightly decrease in comparison to the baseline.

The impact of changes in risk-weighted assets and other items would be more homogeneous across the four scenarios.

Importantly, losses on debt securities held at fair value would be relatively high under the sovereign and private sector debt crisis scenario, contributing about 0.3 percentage point to the decline in the CET1 ratio. The increase in risk-weighted assets would reduce the aggregate CET1 ratio by between 0.4 and 0.7 percentage point.

The impact of interbank contagion on bank solvency is projected to be moderate (see Chart 3.47).⁴⁶

For the simulated networks with the strongest contagion effects, the system-wide CET1 capital ratio would fall by about 0.09 percentage point in some countries under the global risk aversion scenario and the

⁴⁵ For example, cumulative net trading income is projected as an average net trading income over the most recent five years, less two standard deviations of net trading income. Similarly, operating expenses are held constant over the projection horizon.

⁴⁶ 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).

shadow banking spillover scenario. Contagion effects would be more muted under the other two scenarios.

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 2014. It relies on a market-consistent approach to the quantification of risks, and is applied to both 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. In this way, it is conceptually and methodologically different from the bottom-up EU-wide stress-testing exercises carried out regularly by the European Insurance and Occupational Pensions Authority (EIOPA), which also cover a much broader range of European insurers.⁴⁷

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 rates⁴⁸; and (v) an increase in loss rates on loan portfolios. This assessment uses the same four scenarios that were presented earlier in this subsection. **Table 3.1** 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 (see **Table 3.4**).⁴⁹

⁴⁷ For a description of the methodology and results of the EIOPA exercises, see “EIOPA insurance stress test 2014”, 28 November 2014. The 2016 EU-wide EIOPA stress test is expected to be completed by December 2016.

⁴⁸ The lapse rate is defined as the proportion of contracts terminated prematurely by policyholders.

⁴⁹ 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

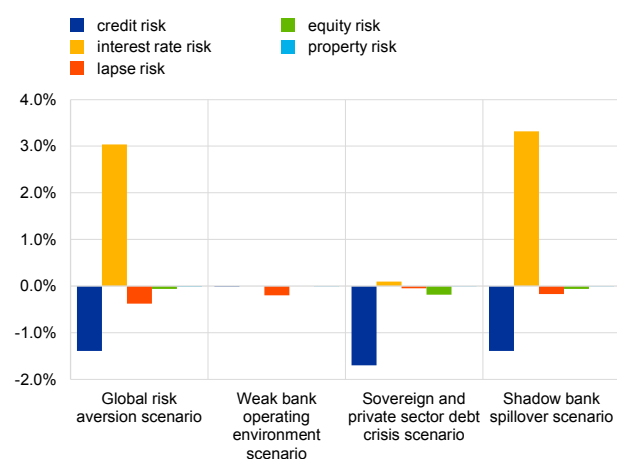
Risk drivers	Technical assumptions
Credit risk	Credit risk assessment carried out using: (i) breakdowns by rating or region, depending on data availability; and (ii) loss rate starting levels, which are stressed using the same methodology as that applied for assessing the resilience of euro area banks.
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. ⁵⁰ Unexpected component of lapses ⁵¹ leads to surrender payments. ⁵² 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 3.48

Change in the net asset values of large euro area insurers under different scenarios

(percentages of total assets; 2015-17)



Sources: Individual institutions' financial reports and ECB calculations.

The shadow banking spillover scenario is projected to have the strongest adverse impact on insurance companies (see Chart 3.48). 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 1.8% and 0.2% of their total assets. In the other two scenarios, the net asset values of insurance companies are projected to increase.

Under all the considered scenarios but the weak bank operating environment scenario, credit risk appears to be the most significant negative driver in terms of net asset value. Although the degree of vulnerability to the materialisation of macro-financial risks is heterogeneous across individual insurance groups, the impact of a widening of credit spreads is similar across the three scenarios where a significant credit-related impact is observed, i.e. the shadow

banking spillover, the global risk aversion and the sovereign and private sector debt crisis scenarios. Under the first of these scenarios, credit risk implies a decline of about 1.7% in net asset values expressed as a percentage of total assets. Under the

⁵⁰ 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) and from ECB calculations.

⁵¹ 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.

⁵² 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).

other two scenarios, the decrease would be of about 1.4%. This outcome is driven mainly by corporate credit risk.

The impact on insurers of the increase in interest rates largely depends on the change in the slope of the yield curve and on the nature of the maturity mismatch between the duration of companies' assets and liabilities. Under the sovereign and private sector debt crisis scenario, the rise in interest rates, combined with a simultaneous steepening of the yield curve and a shorter average duration of insurance companies' assets relative to the duration of their liabilities, would lead to an increase in their net asset values as a percentage of total assets. Indeed, these factors would cause insurers' liabilities to decrease faster than their assets and, thus, would lead to a rise in their net asset value that would fully compensate for the adverse impact of credit risk. By contrast, under the shadow banking spillover scenario, the shock to interest rates combined with the moderate flattening of the yield curve has a muted effect on insurers' net asset values as a percentage of total assets.

Variations in equity price losses would be moderate. The negative impact of the adverse equity price shocks would reach, at most, 0.2% of total assets under the shadow banking spillover scenario, and would be weaker under the other scenarios, reflecting the limited exposure of euro area insurers to equity risk. Finally, lapse risk-related losses would be higher under the global risk aversion scenario, reflecting the more adverse developments in GDP growth and the unemployment rate under this scenario. As a result, the losses due to the increase in lapse rates would amount to about 0.4% of total assets, while they would be below 0.2% in all other scenarios.

3.3 Continued progress in regulatory and macroprudential policy implementation

3.3.1 Macroprudential policy measures

A range of macroprudential measures have been implemented or announced in euro area countries over the last six months.⁵³ The measures introduced have mainly been related to implementing the countercyclical capital buffer and a framework for systemically important institutions pursuant to the requirements of CRD IV. Additional measures targeted at risks related to residential real estate have been adopted in some euro area countries, with the aim of limiting undesirable developments in domestic property markets.

A first set of noteworthy measures relates to systemically important institutions, which are critical nodes in the cross-sectional dimension of systemic risk. In accordance with the requirements set out in CRD IV, the national

⁵³ A more comprehensive overview of the macroprudential measures implemented in euro area countries is available in [Macroprudential Bulletin](#), Issue 1/2016, ECB, March 2016.

authorities of all SSM countries have undertaken to identify the global systemically important institutions (G-SIIs) and other systemically important institutions (O-SIIs) within their jurisdiction. France, Germany, Italy, Spain and the Netherlands have formally designated nine institutions as G-SIIs and decided to implement a G-SII buffer requirement. Following the EBA's guidelines on the criteria for identifying O-SIIs, almost all countries have published a list of the institutions designated as O-SIIs. Several countries have also decided to apply an O-SII buffer requirement starting from 2016. The designated authorities may require O-SIIs to maintain an O-SII buffer of up to 2% of the total risk exposure amount (i.e. risk-weighted assets). These measures aim to increase the resilience of systemically important banks, in order to reduce the "too-big-to-fail" subsidy and effectively improve the stability of the whole financial system. In a number of countries, the buffers are being phased in gradually.

A second set of noteworthy measures relates to countercyclical policies, namely national countercyclical capital buffers. Following the CRD IV requirement to implement countercyclical capital buffers from the beginning of 2016, all euro area countries have started the quarterly setting of countercyclical buffer rates. The aim of the countercyclical capital buffer is to protect banks from periods of excessive credit growth, which have often been associated with the build-up of system-wide risk. However, given current subdued credit growth, which results in negative or small credit-to-GDP gaps, the buffer rate has been set at 0% in all of these countries.

3.3.2 Regulatory framework

This subsection 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 to both reduce systemic risk and strengthen the resilience of the financial system as a whole.

Regulatory initiatives for the banking sector

Prudential rules for banks

IRB review: The Basel Committee on Banking Supervision (BCBS) is currently undertaking 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 24 March 2016 a consultation document on the revision of the internal modelling rules for credit risk. The BCBS has proposed: (i) removing the option to use the internal ratings-based (IRB) approaches 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 for which constrained modelling will be allowed;

and (iii) better specifying parameter estimation practices where the IRB approaches remain available. Finally, the BCBS also plans to introduce the possibility of setting output floors based on the risk weights obtained under the standardised approach.

Simplifying the framework and increasing its transparency is a crucial step to preserve confidence in the risk-weighted approach and in the associated risk-based capital ratios.

The problem of excessive RWA variability, as well as the opacity and complexity of RWAs, became evident after the 2008 financial crisis. Importantly, RWA variability is the desired outcome of the risk-weighted approach when it reflects different underlying risk profiles (“good” RWA variability). However, RWA variability is unwarranted if it is unrelated to risk and arises from errors in model estimations or other deficiencies in banks’ modelling practices or from differences in legal frameworks and supervisory practices (e.g. model validations) at the national level (“bad” RWA variability). The proposed revisions of the framework represent a crucial element to complete the post-crisis financial reforms by reducing the bad RWA variability and preserving the effectiveness of the risk-weighted approach while keeping it sufficiently risk-sensitive. The reforms are intended to increase confidence in banks’ capital ratios and in the capital framework.

The BCBS’s oversight body, the Group of Central Bank Governors and Heads of Supervision (GHOS), has indicated that all the regulatory reforms, including the IRB review, will not significantly increase overall capital requirements, given that bank capital requirements have already been substantially increased by post-crisis reforms.

A quantitative impact study (QIS) undertaken by the BCBS will also test the implications of the proposed new rules on capital levels. The outcome of the QIS will help the BCBS to make an informed decision on the final design and calibration of the measures.

Sovereign exposures: The BCBS is undertaking a review of the regulatory standards for the prudential treatment of banks’ exposures to sovereigns. This review is motivated by the experience from the last financial crisis and the significant challenges that the sources and channels of sovereign risk can pose to the banking system. The revision of the regulatory framework by the BCBS is being conducted in a “careful, holistic and gradual manner”. The regulatory treatment of sovereign exposures is also under discussion in the EU.

Several policy proposals are currently under discussion at the European level.⁵⁴ Possible options, in addition to keeping the current regulatory framework unchanged, include: (i) enhanced Pillar 2 (supervisory review) measures and Pillar 3 (disclosure) requirements; (ii) Pillar 1 (capital) requirements for sovereign exposures to mitigate credit risk; (iii) quantitative restrictions on sovereign exposures (i.e. hard large exposure limits); and (iv) “hybrid” options leading to capital add-ons depending on concentration risk, in possible combination with credit risk.

Three broad principles guide the ECB’s approach to the review of the regulatory treatment of sovereign exposures in the BCBS and within the EU.

⁵⁴ See [Strengthening the banking union and the regulatory treatment of banks’ sovereign exposures](#), Informal ECOFIN, Dutch Presidency note, 22 April 2016.

First, any regulatory change should come about through price effects rather than quantitative restrictions. The risks associated with banks' exposures to a given sovereign thus need to be addressed by means of the introduction of risk weights linked to predefined concentration thresholds, in possible combination with non-zero credit risk weights. Their design and calibration should be consistent with other areas of the regulatory framework, such as requirements relating to liquidity and banks' collateral management. Second, any reform should avoid causing severe market disruptions. It should thus be done very carefully in order not to impair the key role of sovereign assets in the functioning of financial markets, as well as in the implementation and transmission of monetary policy. It should also seek to minimise any potential negative impact on the real economy. Third, any reform has to be agreed at the global level to ensure that international competitiveness of euro area banks is not undermined.

Liquidity regulation (NSFR): In December 2015 the European Banking Authority (EBA) published a report on the impact and calibration of the net stable funding ratio (NSFR) in which it recommended the introduction of the NSFR in the EU with a similar calibration to that proposed by the BCBS, while taking into account EU specificities for certain activities and business models.

The European Systemic Risk Board (ESRB) was consulted on the EBA report and also supported the introduction of the NSFR based on the BCBS calibration. The EBA analysis did not reveal any expected significant impact on bank lending or markets. Moreover, the EBA also found no compelling argument to exempt banks from the NSFR on the basis of their size. The Capital Requirements Regulation (CRR) mandates the Commission to submit a legislative proposal by the end of 2016 on the NSFR taking into account the EBA report and the ESRB response. In line with the Regulation, the ECB will decide on the treatment of central bank reserves and on the calculation of encumbrance levels for assets which are mobilised by banks as collateral in connection with monetary policy credit operations.

Leverage ratio: Work on the leverage ratio is progressing on various fronts. The BCBS is currently working on the final aspects of the leverage ratio and will finalise the calibration this year. The GHOS agreed on 10 January 2016 that the minimum level of the Tier 1 leverage ratio should be 3% and discussed additional requirements for G-SIBs. Any final adjustments must be made to the framework by 1 January 2017, with a view to migrating to a Pillar 1 treatment on 1 January 2018. At the European level, the EBA has continued its work on the impact and calibration of the leverage ratio. The resulting report will provide an impact assessment for the leverage ratio, taking into account potential behavioural implications of a leverage ratio requirement, the leverage ratio's interaction with other prudential requirements and cyclicality. The report will also consider different business models and include an assessment of whether the leverage ratio should differ for institutions following different business models. Based on the results of this report, the European Commission will submit a report on the impact and effectiveness of the leverage ratio to the European Parliament and the Council by the end of 2016. If introduced as a binding requirement in Pillar 1, the leverage ratio will be a useful complementary measure to ensure systemic stability by providing for a limit on the extent to which

leverage may build up in the banking sector, thereby reinforcing the risk-based capital requirements.

Securitisation: The technical work on simple and transparent securitisation continued at a heightened pace at the European and international levels.

Internationally, following the publication of the final criteria on simple, transparent and comparable (STC) securitisations by the BCBS-IOSCO in July last year, the BCBS published on 10 November a consultation paper addressing how the STC criteria should be incorporated into the bank capital framework. In Europe, following the European Commission's publication at the end of September of two regulatory proposals on securitisation, the European Council worked swiftly and finalised in early December a compromise text representing its stance in the upcoming triologue negotiations. The Council compromise text proposes several important amendments, such as providing a role for regulated third parties to verify simple, transparent and standardised (STS) compliance and relaxing the requirements regarding the inclusion of non-performing exposures in STS securitisations. The European Parliament has started work on the dossier and expects to finalise its stance in the course of 2016. It is important that progress is made by legislators to bring the project to fruition.

The ECB published its opinion⁵⁵ on the Commission's proposals on 14 March⁵⁶ in which it welcomes the Commission's proposals and considers that they strike the right balance between the need to revive the European securitisation markets and the need to maintain the prudential nature of the securitisation framework. Securitisation plays an important role in increasing financial stability and the resilience of the banking system, due to its dual role as both a funding and risk transfer instrument. A well-functioning securitisation market also supports economic growth and enhances the transmission mechanism of monetary policy. The opinion makes a series of key recommendations on the STS criteria, on STS implementation, supervision and sanctioning, as well as on the STS treatment in the bank capital framework. The ECB's recommendations aim to, inter alia, encourage the adoption of the STS framework by issuing and investing banks, increase the transparency of STS securitisations to investors, strengthen the prudential regime of STS securitisations and support securitisation issuance in general and from vulnerable euro area countries in particular.

Crisis management and resolution of banks

In the EU, the Bank Recovery and Resolution Directive (BRRD), published on 12 June 2014, states that institutions shall meet, at all times, a minimum requirement for own funds and eligible liabilities (MREL). The MREL for each institution is determined by the resolution authority, after consulting the competent authority to ensure that the institution can be resolved by applying the resolution

⁵⁵ Opinion of the European Central Bank of 11 March 2016 (CON/2016/11).

⁵⁶ The European Commission published two proposals at the end of September: (i) a proposal for an umbrella regulation creating the regulatory framework under which STS securitisations can be issued; and (ii) a proposal for a CRR update that implements both the Basel 2014 securitisation and the STS frameworks.

tools in a way that meets the resolution objectives. Thus, MREL is determined for each institution through a case-by-case assessment, starting this year when the bail-in tool becomes fully operational. Hence, MREL will be key for the effectiveness of the new resolution framework.

At the international level, the Financial Stability Board (FSB) agreed in November 2015 on a new international total loss-absorbing capacity (TLAC) standard for the global systemically important banks (G-SIBs). The TLAC standard aims to ensure that there will be sufficient loss-absorbing and recapitalisation capacity in G-SIBs to implement an orderly resolution, while minimising the impact on financial stability and avoiding the use of public money. Although TLAC is a very similar concept to MREL in the BRRD, there are some key differences, e.g. regarding the scope, denominator, calibration, eligibility of instruments, relationship with capital requirements and treatment of exposures to eligible instruments, among other things. Opportunely, the BRRD provides for an MREL review in 2016 (see [Table 3.5](#)). This will enable a TLAC implementation in the EU which ensures consistency between the two standards, while still recognising that TLAC was developed for G-SIBs and MREL applies to all banks.

European Deposit Insurance Scheme

The European Commission published a legislative proposal for a European Deposit Insurance Scheme (EDIS)⁵⁷ on 24 November 2015, together with a communication on completing banking union via so-called risk-reduction or risk-mitigation measures.⁵⁸ As also outlined in the ECB's opinion on the proposal,⁵⁹ such a scheme has the potential to enhance financial stability in Europe by ensuring a uniform level of depositor confidence across the banking union. 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. Data on deposits of households and non-financial corporations in selected euro area countries suggest that uneven levels of confidence in national deposit guarantee schemes (DGSs) and their backstops might indeed play a relevant role in driving deposit inflows and outflows, together with other factors including broader economic and financial conditions.⁶⁰

By bringing depositor protection at the European level, such a scheme could allow diversification benefits to be reaped (as risks are spread more widely across a larger pool of financial institutions) and could reduce the likelihood that individual payouts could overwhelm national DGSs. Such a scheme is also more likely to be fiscally neutral over the medium term for the banking union as a whole, given that any single payout event will be less significant compared with the overall funding capacity of the banking system.

⁵⁷ Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 806/2014 in order to establish a European Deposit Insurance Scheme, COM/2015/0586 final - 2015/0270 (COD), published on 24 November 2015.

⁵⁸ [Towards the completion of the Banking Union](#), Commission Communication, 24 November 2015.

⁵⁹ Opinion of the European Central Bank of 20 April 2016 ([CON/2016/26](#)).

⁶⁰ [Financial integration in Europe](#), ECB, April 2016.

Table 3.5**Selected new legislation and proposals for legislative provisions for the banking sector in the EU**

Initiative	Description	Current status
IRB review	The BCBS published a consultation document to address excessive RWA variability for credit risk, removing the option to use the IRB approaches for certain exposures. Where IRB approaches are still allowed, input floors – e.g. for probability of default and loss given default – are introduced, as well as better specifications for parameter estimations. The possibility of output floors relative to the standardised approach is also under consideration.	The consultation document was published on 24 March 2016. The BCBS will run a QIS, the outcome of which will help the BCBS to make an informed decision on the final design and calibration of the revised IRB framework.
TLAC standard	The FSB agreed in November 2015 on a new international TLAC standard for global systemically important banks, ensuring that there will be sufficient loss-absorbing and recapitalisation capacity in resolution.	In the EU, the TLAC standard will be implemented through the ongoing MREL review, which will be concluded in 2016, in accordance with the BRRD. The BRRD specifies that the EBA shall submit a report to the Commission on 31 October 2016 regarding how MREL has been implemented at the national level, including how it can be applied to different business models of banks, if the denominator should be changed, and how to ensure consistency with international standards developed by international fora, among other things. On the basis of this report, the Commission will submit a legislative proposal on the harmonised application of MREL, including (where appropriate) the introduction of minimum levels of MREL and other adjustments. The work on the report is currently ongoing at the EBA and preparatory work has also started within the Commission to enable a proposal this year.
European Deposit Insurance Scheme (EDIS)	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).	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. ⁶¹ The EDIS proposal is currently being discussed in the Council in an Ad Hoc Working Party, which is also discussing so-called risk-reduction measures. Discussions at the European Parliament have not started yet. The ECB's legal opinion on the proposal was published on 20 April 2016. ⁶²
Single Resolution Mechanism Regulation (SRM Regulation)	The SRM Regulation establishes a single system, with a Single Resolution Board (SRB) and a Single Resolution Fund (SRF), for an efficient and harmonised resolution of banks within the SSM. The SRM is governed by two main legal texts: the SRM Regulation, which covers the main aspects of the mechanism, and an Intergovernmental Agreement (IGA) relating to some specific aspects of the SRF.	As of 1 January 2016 the SRB is fully operational and has full resolution powers, and the Single Resolution Fund has been established.
Simple, transparent and standardised (STS) securitisations	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 different manner in regulation. The Securitisation Regulation applies 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.	The European Commission made the two proposals (the Securitisation Regulation and the CRR amendment) on 30 September 2015. The European Council agreed on a negotiating stance on the two proposals on 2 December. The European Parliament expects to finalise its stance in the course of 2016. Trialogue negotiations are currently expected in early 2017. The ECB published its opinion on the Commission's proposals on 14 March. The BCBS launched a consultation on how to incorporate the STC securitisations in the bank capital framework on 10 November 2015 and is expected to finalise the revisions to the securitisation framework in the course of 2016.

Such a scheme could also address a number of financial stability-related issues. First, it would further contribute to weakening the bank-sovereign nexus.

Second, the lack of a uniform level of depositor confidence across the banking union might create dangerous contagion mechanisms, which may jeopardise financial stability even in member countries with a more favourable fiscal position. Finally, to address moral hazard the EDIS proposal follows the “polluter pays” principle by requiring riskier banks to pay higher contributions, based on a banking union-wide methodology for risk assessment. In this context, banks perceived as more resilient would pay lower fees, reflecting their lower risk profile, while benefiting from the strong mutualised safety net.

It should be noted that a deposit insurance fund, even one that is elevated to the European level in the form of an EDIS, cannot be designed so as to be able

⁶¹ [Complementing Europe's Economic and Monetary Union](#), European Commission, 22 June 2015.

⁶² Opinion of the European Central Bank of 20 April 2016 ([CON/2016/26](#)).

to meet payout requests for all deposits in the banking system at the same time, implying that an explicit or implicit public backstop plays a crucial role to preserve confidence. Only an EDIS coupled with a credible common backstop will underpin depositor confidence in the banking union as a whole, notably by offering protection also in the case of large local shocks. Such a backstop would reinforce depositor confidence, reduce the risk of bank runs and increase financial stability across the banking union. Thus, a fiscally neutral common public backstop for EDIS at the latest as of the full insurance stage is necessary to ensure a uniform level of confidence and to effectively weaken the bank-sovereign link. Any such backstop for the deposit insurance fund must respect the principle of fiscal neutrality, ensuring that any public funds are recouped from the financial sector via ex post contributions. The use of the European Stability Mechanism would be an option for the establishment of a fiscally neutral common public backstop.

Regulatory initiatives for financial markets and financial infrastructures

In addition to 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.

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 resilient market-based financing”, published on 14 November 2014. Over the last six months the FSB has been working on developing policy recommendations to address the risks associated with asset management activities. In particular, this work focuses on addressing vulnerabilities related to: (i) the mismatch between the liquidity of fund investments and the redemption terms and conditions for fund units; (ii) leverage within investment funds; (iii) operational risk and challenges in transferring investment mandates in stressed conditions; and (iv) securities lending activities of asset managers and funds. The ECB actively supports this work, given the growing importance of this part of the financial system and the need to extend the macroprudential toolkit to mitigate risks to financial stability beyond banking.

In Europe, the Regulation on transparency of securities financing transactions and of reuse (SFTR) was published on 23 December 2015 and contains measures aimed at increasing the transparency of securities lending and repurchase agreements through the obligation to report all transactions to trade repositories. The first phase of reporting is expected to commence in 2018. The SFTR also imposes minimum market-wide conditions to be met for reuse such as prior consent, as well as the disclosure of the risks and the consequences of reuse, thereby addressing risks related to the lack of transparency on the extent to which financial instruments provided as collateral have been reused.

Financial infrastructures

The ECB Regulation on oversight requirements for systemically important payment systems entered into force on 12 August 2014, aiming, inter alia, to ensure the efficient management of legal, credit, liquidity, operational, general business, custody, investment and other risks of systemically important payment systems. 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.

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 systemically important payment systems (SIPs) face, together with sound governance arrangements, objective and open access, as well as the efficiency and effectiveness of SIPs.	The Regulation entered into force on 12 August 2014.
European Market Infrastructure Regulation (EMIR)	The aim of the Regulation is to bring more safety and transparency to the OTC derivatives markets. It sets out rules for, inter alia, central counterparties and trade repositories.	The Regulation entered into force on 16 August 2012. The Regulatory Technical Standards on the mandatory central clearing of standardised OTC interest rate swaps entered into force on 21 December 2015.
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 Commission is currently considering technical standards drafted by the European Securities and Markets Authority (ESMA) and European Banking Authority (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, 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.
Proposal for a Money Market Fund Regulation (MMF Regulation)	The proposal addresses the systemic risks posed by this type of investment entity by introducing new rules aimed at strengthening their liquidity profile and stability. It also sets out provisions that seek, inter alia, to enhance their management and transparency, as well as to standardise supervisory reporting obligations.	The European Commission's proposal was published in September 2013. The ECON Committee of the European Parliament adopted its position on 26 February, while discussions are still ongoing in the Council. The ECB adopted its position on 21 May 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.

Implementation of the European Market Infrastructure Regulation (EMIR) has continued to make progress. Starting on 21 June 2016, certain types of standardised interest rate swaps will have to be cleared through central counterparties (CCPs). Mandatory clearing of over-the-counter (OTC) derivatives, which enhances the security and transparency of these markets, is a key aspect of the regulatory response to the financial crisis.

In September 2015 the ECB published its response to the Commission's consultation on the review of EMIR, in which it proposes 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 on 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.

Regulatory initiatives for the insurance sector

Solvency II – the new EU supervisory framework for insurance – has been applicable since 1 January 2016 and represents a major step towards supervisory convergence, e.g. by ensuring uniform and appropriate conditions for the calculation of technical provisions^{63 64} by (re)insurers across Europe. Further work has been undertaken in the area of insurers' infrastructure investments. After a second call for evidence⁶⁵ by EIOPA to prepare further technical advice to the Commission on the identification and calibration of other infrastructure investment risk categories, i.e. infrastructure corporates, EIOPA published a related consultation paper⁶⁶ in April 2016. Following an amendment to Solvency II, certain requirements for investing in qualifying infrastructure projects have already been lowered for insurers. In March 2016 EIOPA also published a paper on a potential macroprudential approach to the low interest rate environment in the Solvency II context.⁶⁷

At the international level, the assessment methodology for global systemically important insurers (G-SIIs), which has been used since 2013, is currently under discussion. In November 2015 the International Association of Insurance Supervisors (IAIS) launched two public consultations, one focused on the refinement of the assessment methodology, the other aiming to define more precisely the concept of non-traditional non-insurance (NTNI) activities. The IAIS will conclude on the outcome of these consultations later this year. Furthermore, following a public consultation, the FSB published the final Guidance for regulators, supervisors and resolution authorities on developing effective resolution strategies and plans for systemically important insurers.

⁶³ [Commission Implementing Regulation \(EU\) 2016/165](#) laying down technical information for the calculation of technical provisions and basic own funds for reporting with reference dates from 1 January until 30 March 2016 in accordance with Directive 2009/138/EC of the European Parliament and of the Council (Solvency II), 5 February 2016.

⁶⁴ [Consultation Paper on the methodology to derive the UFR and its implementation](#), EIOPA, 6 April 2016.

⁶⁵ [Call for evidence concerning the request to EIOPA for further technical advice on the identification and calibration of other infrastructure investment risk categories i.e. infrastructure corporates](#), EIOPA, 19 November 2015.

⁶⁶ [Consultation Paper No CP-16-005 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, 15 April 2016.

⁶⁷ [A potential macroprudential approach to the low interest rate environment in the Solvency II context](#), EIOPA, 23 March 2016.

Other initiatives

Capital markets union

The ECB has strongly supported the European Commission's initiative to establish a capital markets union (CMU) from the outset since a more diversified financial system, with capital markets complementing bank-based funding, could increase the shock-absorbing capacity of the European economy and strengthen cross-border risk-sharing, thereby contributing to financial stability. CMU is aimed at the development of risk capital and thereby should lead to increased private risk-sharing in the EU. This would reduce the reliance on debt-based financing, which has proven to be prone to cyclicity and sudden reversals in the face of shocks. To achieve this, ways to address taxation issues, in particular double taxation and the debt-equity bias, should be examined.

A high level of financial integration (i.e. reducing cross-border barriers) would contribute to stimulating a market-based risk-sharing mechanism across EU Member States and thereby increase the shock-absorbing capacity of the European economy. In order to stimulate international risk-sharing, company and insolvency laws, which are impeding the good functioning of European capital markets, should be harmonised.

However, more integration can exacerbate the scale and speed of cross-border contagion, which underlines the importance of taking a macroprudential view of the financial system and having in place an adequate macroprudential framework and tools to assess and mitigate systemic risks. New risks can appear in particular in non-banking parts of the financial system that are less regulated and more opaque. Therefore, as the CMU project is pursued, a broader and strengthened macroprudential toolkit for the non-bank financial system will need to be developed. In addition, to ensure that there are no unintended financial stability risks to banks from the further development of capital markets, to make capital markets stronger and to achieve deeper cross-border financial integration in bank and market-based financing, the European macroprudential framework for banks should be strengthened.

Special features

A A case for macroprudential margins and haircuts⁶⁸

Financial institutions can build up leverage via the use of derivatives and securities financing transactions (SFTs). In order to limit the build-up of excessive leverage and the associated liquidity risks, as well as the procyclical effects of margin and haircut-setting practices, the macroprudential toolkit needs to be extended. This special feature presents the general case for setting macroprudential margins and haircuts using theoretical and empirical evidence on the effectiveness of various design options. Furthermore, it addresses implementation and governance issues that warrant attention when developing a macroprudential framework for margins and haircuts. It concludes by recommending a way forward that is intended to inform the ongoing policy discussions at the European and international levels.

Introduction

Financial institutions, both banks and non-banks, can build up leverage via the use of derivatives and SFTs. The margins and haircuts set in these transactions determine the amount of leverage that can be created. For example, swaps, futures and other derivatives allow institutions to gain off-balance-sheet exposures to asset classes without having them fully funded. The higher the initial margin on a derivative transaction – the amount of collateral the investor needs to hold in a margin account – the smaller the exposure that can be created with a given amount of equity. In turn, SFTs allow financial institutions to obtain funding and create leverage using the assets they are invested in as collateral. The bigger the haircut on the collateral – the difference between the market value of an asset and its posted value as collateral – the smaller the exposure that can be created with a given amount of collateral.⁶⁹

From a macroprudential perspective, the procyclical nature of margin and haircut-setting practices of market participants is a significant concern. As margin and haircut requirements tend to be a function of recent market developments, these practices stimulate the build-up of excessive leverage and funding risk in good times, while amplifying funding stress and deleveraging in bad times. During upturns, low volatility in asset prices and perceived low risks lead to low margins and haircuts. When the cycle turns, rising risk awareness and increasing volatility feed into higher margins and haircuts, leading to deleveraging and increasing margin calls. As the build-up of leverage leaves market players with lower loss-absorbing capacity, margin calls can lead to fire sales, market and funding

⁶⁸ This special feature was prepared by Niccolò Battistini, Michael Grill, Pierre Marmara and Koen van der Veer.

⁶⁹ Note that haircuts are also relevant for derivative transactions when margin is posted in the form of non-cash collateral, where haircuts are applied to account for potential changes in the price of this collateral.

illiquidity and contagion across financial markets as firms seek to meet withdrawals and hoard liquidity.

While a number of policy measures aimed at limiting the procyclical effects of margin and haircut-setting have been taken or are under way, none of the current frameworks envisage a role for macroprudential authorities (see Table A.1). For example, at the EU level, the European Market Infrastructure Regulation (EMIR) requires market players to use anti-procyclicality tools such as margin buffers, specific weights for stressed observations, and margin floors. However, it does not provide macroprudential authorities with the tools to vary margin and haircut requirements across the financial cycle. Raising margin and haircut requirements in exuberant times would work against the build-up of leverage when it is deemed necessary, and would also lower the impact of procyclical changes in margins and haircuts in bad times driven by higher volatility and higher risk aversion of market participants.⁷⁰

Table A.1

The overview of the regulatory landscape for derivatives and SFTs shows that none of the current frameworks envisages an active role for macroprudential authorities

Gaps in scope of coverage and macroprudential design of regulation on margins and haircuts

	Derivatives (OTC)		SFTs	
Estimated size of the EU market	≈ €242 trillion ¹		≈ €3.4 trillion ³ (repurchase agreements: €2.9 trillion; securities lending: €0.5 trillion)	
	Centrally cleared ²	Non-centrally cleared	Centrally cleared repos ≈ €1.9 trillion ⁴	Non-centrally cleared repos ≈ €1.0 trillion ⁴
Key global regulatory frameworks	CPMI-IOSCO Principles for Financial Market Infrastructures (April 2012)	BCBS/IOSCO margin and haircut requirements (March 2015)	CPMI-IOSCO Principles for Financial Market Infrastructures (April 2012)	FSB minimum haircut floors (November 2015)
EU regulatory framework	EMIR		EMIR SFT Regulation for reporting	SFT Regulation for reporting, SFT Regulation clause for haircuts
Scope of coverage	Exempts non-financial counterparties with gross notional OTC exposures below a certain threshold (€1 billion or €3 billion depending on the type of product)	Exempts counterparties with gross notional OTC exposures below €8 billion	Exempts non-financial counterparties with gross notional OTC exposures below a certain threshold (€1 billion or €3 billion depending on the type of product)	FSB framework covers SFTs against collateral other than government securities where financing is provided from banks to non-banks and between non-banks
Macro-prudential tools	NO	NO	NO	FSB minimum haircut framework would set hard floors, but does not provide rules for countercyclical changes

1 Gross notional amount (source: BIS semi-annual OTC derivatives statistics, June 2015). Gross market value: €8.4 trillion.

2 According to trade repository data collected by the ECB, approximately 12.8% of OTC derivative trades in the euro area are centrally cleared (volume of trades, February 2016).

3 Reverse repurchase agreements: €2.9 trillion (source: ICMA, European Repo Market Survey, September 2015); securities lending: €0.5 trillion (source: ESMA Report on Trends, Risks and Vulnerabilities, No 2, 2015)

4 Based on the shares of centrally cleared (66%) versus non-centrally cleared (34%) bilateral repos, as reported in the September 2015 ECB Euro Money Market Survey.

Furthermore, addressing the build-up of leverage in SFTs and derivatives requires a broad regulatory scope. An approach that differentiates between different types of transactions, i.e. whether derivatives and SFTs are centrally cleared or not, or whether they are transactions between banks or between banks and non-banks, risks being ineffective owing to substitution effects. As a result, transactions outside the scope of the framework may be used instead to build up leverage.

⁷⁰ It should be noted that higher volatility and higher risk aversion also make it difficult to incentivise institutions to reduce margins and haircuts during a downturn.

Therefore, in its response to the public consultation on the EMIR review, the ECB proposed establishing a framework for macroprudential margins and haircuts. The ECB suggested including minimum floors and time-varying add-ons, applied to counterparties at the transaction level.⁷¹ It was considered that all relevant transactions would need to be affected, including those contracted by non-banks, regardless of whether these transactions have been concluded in the centrally cleared market, the non-centrally cleared market, or by EU counterparties clearing their trades via a non-EU central counterparty (CCP).

This special feature summarises recent theoretical evidence and presents some initial empirical results on the optimal design of margin and haircut regulation. Furthermore, it highlights practical and governance issues regarding the implementation of macroprudential margins and haircuts, and concludes by setting out the way forward.

Theoretical evidence on the need for macroprudential margin and haircut regulation

One way of analysing the basis for macroprudential margin and haircut regulation is through the prism of a general equilibrium model framework.⁷² In this setting, a macroprudential authority has the power to set haircut requirements for SFTs. Given that the economics behind the build-up of leverage and the procyclical effects of margin-setting practices are similar for derivatives, the analysis can be valid for both margin and haircut regulation, bearing in mind that the complexity of derivatives may require additional analysis.

The model presented allows the quantitative implications of different haircut regulations for financial market outcomes like asset return volatility to be derived. Two design options for haircut regulation are considered: constant haircut floors and floors combined with a time-varying countercyclical add-on. With constant haircuts, the same minimum haircut requirements apply over the whole financial cycle. For countercyclical haircut regulation, the macroprudential regulator has the power to impose additional haircuts in boom times when the build-up of leverage becomes excessive. The study addresses two key questions regarding the scope and optimal design of margin and haircut regulation: first, is it necessary for such regulation to have a broad scope? Second, are time-varying haircuts preferable to simple minimum requirements such as floors?

The analysis shows that a broad scope is required for an effective macroprudential framework. A set-up with two asset classes, i.e. two markets, is considered. For the first class of assets, the minimum haircut requirement is set by a regulator, while the requirement for the second asset class is determined by market

⁷¹ “ECB response to the European Commission’s consultation on the review of the European Market Infrastructure Regulation (EMIR)”, September 2015.

⁷² Brumm, J., Grill, M., Kubler, F. and Schmedders, K., “Margin regulation and volatility”, *Journal of Monetary Economics*, No 75, 2015. Note that the paper generally uses the term “margin requirement” instead of “haircut requirement”.

participants. The impact of regulation in this set-up is compared with the outcome of regulating both asset classes. For the setting with the small regulatory scope, it is shown that if investors have access to another *unregulated* market where investors can use assets as collateral to take up leverage without any regulatory restrictions on the haircut applied, changes in the regulation in one market may have only minor effects on those assets' return volatility. This compares with the significant reduction in overall volatility that is found in the setting where regulators are empowered to set haircuts for both markets.

Time-varying countercyclical haircuts turn out to be more effective than constant haircuts. The analysis presented shows that applying countercyclical regulation reduces return volatility and increases welfare significantly more than does constant regulation. In response to larger haircut requirements in good states, market participants are more constrained in their build-up of leverage compared with the situation where haircut floors would remain flat. When a negative shock occurs, withdrawal of such a countercyclical add-on decreases the deleveraging pressure induced by binding collateral constraints.

Taken together, this theoretical evidence indicates that only comprehensive regulation of margins and haircuts can reduce the build-up of leverage and asset market volatility in an economically meaningful way. Any macroprudential margin and haircut framework should therefore have a broad scope – capturing both derivatives and SFTs, and both centrally cleared and non-centrally cleared transactions. Moreover, this theoretical evidence shows that floors combined with a time-varying countercyclical buffer are more effective in reducing volatility and increasing welfare than constant minimum requirements, such as constant floors. This suggests that any policy framework should ideally allow regulators to set countercyclical margins and haircuts.

Empirical evidence on optimal margin and haircut regulation

In this section, some initial empirical results on the optimal design of margin and haircut regulation are provided. Following the theoretical analysis, the focus is again on the effectiveness of a constant minimum requirement versus countercyclical requirements, and the extent to which these different tools would reduce the procyclicality of margins in the cash equity market is analysed.⁷³ Daily stock market data allow for an empirical analysis of the effectiveness of macroprudential margin regulation. However, given that market players typically charge additional procyclical margin add-ons in derivative contracts, the results here are likely to underestimate any potential gains from macroprudential regulation in derivatives markets.⁷⁴

⁷³ The empirical analysis in this section is based on Battistini, N., “*Pro-cyclicality of margin requirements: Determinants, mitigation and measurement*”, mimeo, 2015.

⁷⁴ To draw final conclusions on the calibration of macroprudential margins and haircuts in derivative transactions and SFTs, EMIR and SFT Regulation data could be used in future work.

Empirical strategy and data

The empirical strategy contains three building blocks: (i) a model that simulates baseline margins⁷⁵ using current benchmark market methodologies, (ii) four measures for the procyclicality of these margins, and (iii) two policy tools that could potentially reduce margin procyclicality – a minimum margin floor and a combination of a floor with a countercyclical buffer.

First, to model baseline margin dynamics, daily data on stock prices are used for the shares of the 50 largest euro area firms, as measured by market capitalisation, for the period between January 2005 and December 2014. These data allow a standard simulation technique to be applied to compute portfolio exposures and the associated returns for a representative investor,⁷⁶ using a portfolio decision model that is widely used by market participants.⁷⁷ On the basis of the portfolio returns, baseline margins are calculated by applying a model that is consistent with the margin methodology used by CCPs for their clearing services.⁷⁸

The second building block includes four measures to assess procyclicality in the simulated baseline margins. The first two measures account for the variation in margins – i.e. both the short and long-term elasticity of margins to volatility shifts are measured.⁷⁹ The third and fourth measures examine the tendency of margins to co-move with the cycle – i.e. the coincidence of high margins with periods of high volatility, low liquidity and deleveraging (and vice versa). The correlation of margins with the volatility regime (proxied by the ECB's composite indicator of systemic stress (CISS) equity market sub-index) and with the liquidity cycle (proxied by the ECB's financial market liquidity indicator (FMLI) foreign exchange, equity and bond markets sub-index) is calculated.

⁷⁵ Margin is defined as the amount of collateral that an investor has to post in order to cover potential variations in the market value of its position for the duration of the margin period of risk (i.e. close-out period, liquidation period, or period between the initiation of the clearing process and the settlement of the transaction) and is expressed as a percentage of the market value of an investor's holdings of shares. In other words, if EUR p is the market value of one share and q is the number of shares held by the investor, then a margin requirement of $x\%$ implies that the investor has to post EUR $(x/100) \cdot p \cdot q$ as collateral.

⁷⁶ This modelling choice, which is used in the literature (see, for example, Heath, A., Kelly, G. and Manning, M., "Central counterparty loss allocation and transmission of financial stress", *Research Discussion Paper*, Reserve Bank of Australia, 2015), implies a partial equilibrium framework, which establishes a clear dependence of margin requirements on price dynamics, but does not allow for any feedback mechanism such as that in the structural analysis by Brumm et al. (2015) discussed in the previous section.

⁷⁷ The investor allocates its available funds according to a mean-variance (MV) portfolio optimisation problem, the workhorse framework of modern portfolio decision models. The MV portfolio allows for time-varying weights and both long and short positions. Moreover, the portfolio exhibiting the maximum Sharpe ratio (i.e. the maximum risk-adjusted return) on the frontier of efficient portfolios is selected.

⁷⁸ In this empirical exercise, baseline margins are calculated according to a historical expected shortfall model with a one-year look-back period and a one-day close-out period. The calibration of the model aims to replicate actual margin models used by CCPs. Results do not differ qualitatively if the look-back or close-out period increases.

⁷⁹ Short-term volatility is measured as the average 30-day peak-to-trough relative (i.e. percentage) distance greater than the 90th percentile of the historical distribution. Long-term volatility is measured as the peak-to-trough relative distance (representing the largest across-the-cycle margin call in percentage terms) of the historical distribution. Similar measures of procyclicality have been proposed in the literature (see Murphy, D., Vasios, M. and Vause, N., "An investigation into the pro-cyclicality of risk-based initial margin models", *Financial Stability Paper*, Bank of England, 2014).

Finally, the performances of a margin floor and a combination of a floor with a countercyclical buffer are compared. The first mitigation tool, enacted into EU law via the Regulatory Technical Standards (RTS) of EMIR, is a minimum margin floor computed with a ten-year look-back period. Strictly speaking, the margin floors are not “hard” floors, but depend on past volatility. Nevertheless, as in this setting, they do not depend on models devised by market participants and can be considered as a proxy for a hard minimum floor. The second mitigation tool is a margin obtained by adding a countercyclical buffer on top of the minimum margin floor. This margin buffer is calculated as a function of the weighted average of the volatility and liquidity cycle indicators, where higher volatility and/or liquidity imply a lower buffer requirement (see **Box 1** for details).

Box 1

Methodology for the computation of the countercyclical margin buffer

The countercyclical margin buffer CMB_t is computed according to a logistic function:

$$CMB_t = \frac{\alpha}{1 + e^{-\beta(\text{cycle}_t - \gamma_t)}}$$

where α denotes the maximum buffer (so that $0 \leq CMB_t \leq \alpha$), β defines the steepness of the curve, cycle_t indicates a weighted average of the volatility and liquidity cycle indicators (see below), and γ_t represents a certain percentile of the historical distribution of cycle_t up to period t (so that, if $\text{cycle}_t = \gamma_t$, $CMB_t = \alpha/2$). In order to compute the aggregate cycle indicator, an exponentially weighted moving average (EWMA) approach is applied to the weighted average of the two cycle indicators considered, formally:

$$\text{cycle}_t = \lambda \text{cycle}_{t-1} + (1 - \lambda)[- \omega \text{CISS}_t + (1 - \omega) \text{FMLI}_t],$$

for a given initial value cycle_0 , where λ denotes the decay parameter (i.e. the relative weight on past information) and ω the relative weight on the indicator of the volatility cycle; note that the negative sign on CISS_t implies that high values of cycle_t represent favourable (low-volatility/high-liquidity) market conditions.

Results

Chart A.1 provides a first visualisation of our key results. It shows that: (i) baseline margins are indeed procyclical⁸⁰, (ii) a margin floor would have prevented the very low levels of margins in the run-up to, and aftermath of, the global financial crisis, and (iii) a countercyclical buffer on top of the margin floor would have further reduced margin procyclicality as a result of the build-up of an additional margin buffer before the crisis.

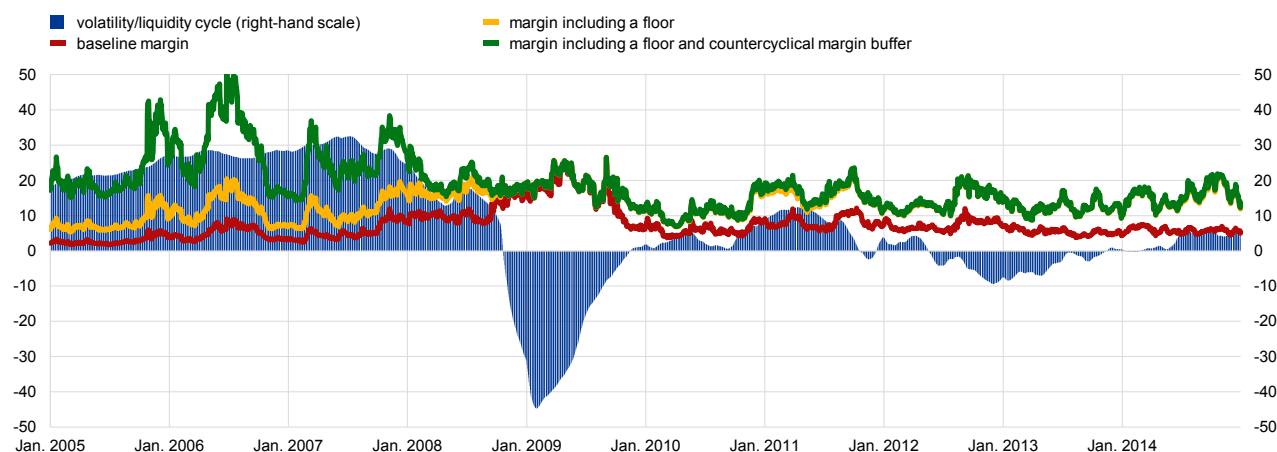
⁸⁰ The term “procyclical” is used in the statistical sense. The empirical study does not model feedback loops on the cycle, as in the general equilibrium framework presented in the previous section on theoretical evidence.

Chart A.1

The dynamics of margins based on different mitigation tools suggest that a margin floor combined with a countercyclical margin buffer would have been more effective in containing the build-up of leverage in the run-up to the crisis

Historical dynamics of margins with mitigation tools

(left-hand scale: margin as a percentage of the market value of an investor's exposure; right-hand scale: volatility/liquidity indicator normalised around zero)



Sources: ECB, Bloomberg and authors' calculations.

First, a negative relationship between baseline margins (red line) and the cycle is observable. Baseline margins increase in response to higher volatility of portfolio returns in the wake of the global financial crisis in mid-2007 and increase more steeply when the crisis intensified in late 2008. Conversely, baseline margins decrease again when financial conditions improved in early 2010. When we regress the baseline margins on the volatility/liquidity cycle, we obtain a coefficient of -0.17 , confirming a negative correlation of the margin with the cycle, i.e. margins go up when volatility is high and liquidity is low.

Second, adding a margin floor to the calculation of baseline margins (yellow line) limits the co-movement of margins with the cycle. Basically, the margin floor assures conservative margins throughout the whole period, preventing the very low baseline margin levels before and after the crisis. Notably, we now find a less negative regression coefficient of -0.12 when we regress the margin including a floor on the volatility/liquidity cycle.

Third, introducing a countercyclical buffer on top of the margin floor further limits the procyclical dynamics of margins (green line). Importantly, we find a positive coefficient of $+0.21$, indicating that margins decline in the downturn of the cycle. Indeed, margins are now considerably higher in the period of high liquidity/low volatility before the crisis, limiting the build-up of excessive leverage. Conversely, at the start of the crisis, the countercyclical margin buffer quickly (but gradually) drops to zero, allowing margins to converge towards the lower margin floor. In this way, the countercyclical buffer prevents deteriorating market conditions from exacerbating liquidity pressures on investors, while preserving prudent margin levels. Thus, both the margin floor and the countercyclical margin buffer appear to be essential mitigation tools in a holistic macroprudential treatment of margins.

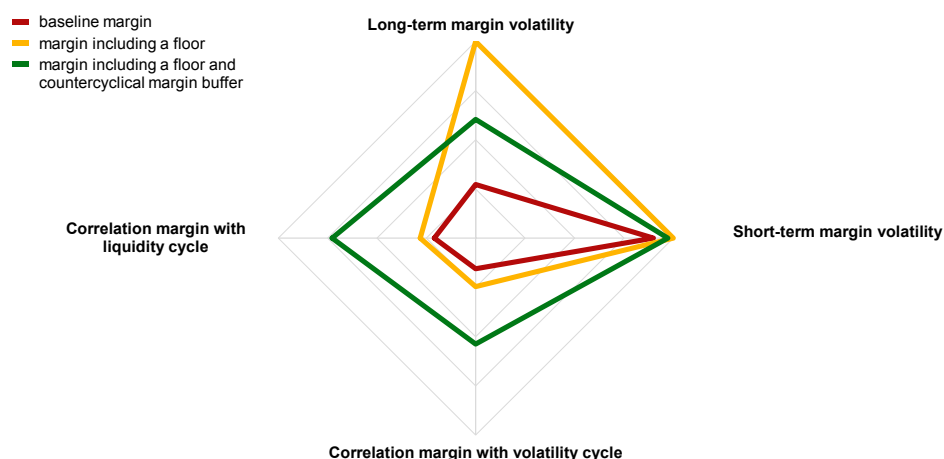
The metrics of margin volatility and margin-cycle correlation show that countercyclical margins perform best in mitigating procyclicality.⁸¹ Chart A.2

shows the results. As a general interpretative key for the spider chart, more procyclical margins produce values closer to the origin of the axes. Clearly, compared with baseline margins (red line), both margin floors (yellow line) and the combination of a floor with a countercyclical margin buffer (green line) prove to be effective tools in mitigating procyclicality. That is, both tools outperform the baseline according to all metrics based on historical data. As regards the margin volatility metrics, the relative performances of both policy tools do not differ significantly. However, with respect to reducing the correlation with the volatility and liquidity cycle, adding a countercyclical buffer considerably outperforms the margin floor.

Chart A.2

The margin combining a floor with a countercyclical margin buffer performs better in mitigating procyclicality than the margin including a floor only

Values closer to the origin indicate more volatility or more (positive) correlation with the liquidity and/or volatility cycle



Notes: Each axis corresponds to one of the four different metrics of procyclicality. Each metric has been rescaled so as to lie in the same range of values, while preserving the relative ranking among margins in terms of procyclicality.

Practical and governance issues concerning implementation

A macroprudential framework for margins and haircuts should build on the current regulatory frameworks and policy recommendations as applicable to derivatives and SFTs at the EU and global levels. These frameworks include the Financial Stability Board (FSB) policy recommendations for haircuts on non-centrally cleared SFTs, the Basel Committee on Banking Supervision-International Organization of Securities Commissions (BCBS-IOSCO) margin requirements for non-centrally cleared derivatives and EMIR.⁸² Together, these rules establish

⁸¹ Simulations are carried out by (1) modelling each of the 50 time series for stock returns according to an ARMAX(1,1)-GARCH(1,1) process, (2) extracting residuals and estimating their copula *t*-distribution, (3) simulating 500 time series of residuals, each one of 4,898 daily observations, (4) reconstructing simulated price returns and (5) computing portfolio exposures and margins for each simulation.

⁸² Regulation (EU) No 648/2012.

conservative margin and haircut requirements that minimise market risk in the event of a counterparty default. They state that haircuts and margins should be calibrated to a high confidence level (e.g. 99.5% for initial margins on OTC derivatives under EMIR), using prudent liquidation and historical time periods. Furthermore, the FSB guidance establishes numerical floors for haircuts on SFTs, while the BCBS-IOSCO rules include predefined margin⁸³ and haircut⁸⁴ schedules to be used as possible alternatives to internal or third-party models. In addition to addressing market risk, these rules seek to limit the potential procyclical effects of margins and haircuts to a certain extent: the BCBS-IOSCO rules authorise the inclusion of periods of stress within look-back periods, while EMIR goes further by requiring the use of anti-procyclicality tools such as margin buffers, specific weights for stressed observations, and margin floors.⁸⁵ However, current rules covering derivatives and SFTs do not provide authorities with specific macroprudential tools to raise margin and haircut levels beyond regulatory requirements to prevent the build-up of excessive leverage in the financial system.

Existing standardised margin and haircut schedules are simple and transparent, and could form the basis for setting macroprudential margins and haircuts. Macroprudential authorities could adopt a similar approach to the standardised FSB/BCBS-IOSCO haircut and margin schedules, which offer a transparent means of calculating initial margins and predefined haircut levels which can be used as alternatives to internal haircut calculation models.⁸⁶ Macroprudential authorities could draw inspiration from this approach by setting market-wide margin and haircut floors on the basis of a standardised initial margin/haircut formula, which would be disconnected from the features of internal models. The parameters of the standardised margin/haircut calculation could be adjusted to match the degree of systemic risk in the financial system and the desired reduction in leverage. This would address the fact that counterparties can frequently calibrate margins and haircuts according to internal or third-party risk models with wide discretion. Going forward, competent authorities should develop indicators as part of the operational framework for setting such macroprudential margins and haircuts over the cycle.

Ensuring non-bank entities are appropriately affected by market-wide margins and haircut requirements would be a key aspect of any future macroprudential regime. To a significant extent, non-banks currently access derivatives markets indirectly by channelling their activity through larger financial institutions, which act as principals to the transactions (the complex indirect structure of these markets is known as “tiering”). It is possible that the effects of macroprudential tools would be distorted as a result of this indirect structure, and not fully affect the behaviour of the entities ultimately driving leverage in the system, particularly in centrally cleared

⁸³ See “BCBS-IOSCO margin requirements for non-centrally cleared derivatives”, Annex A, 2015.

⁸⁴ See “BCBS-IOSCO margin requirements for non-centrally cleared derivatives”, Annex B, 2015.

⁸⁵ See “ESRB report on the efficiency of margining requirements to limit pro-cyclicality and the need to define additional intervention capacity in this area”, July 2015.

⁸⁶ The standardised initial margin calculation proposed under the BCBS-IOSCO guidance is the following: $Net\ standardised\ initial\ margin = 0.4 * Gross\ initial\ margin + 0.6 * NGR * Gross\ initial\ margin$, where NGR is defined as the level of net replacement cost over the level of gross replacement cost for transactions subject to legally enforceable netting agreements.

markets. Macroprudential tools would need to be designed to ensure they can be fully “passed through” to non-banks.

The implementation of any future macroprudential regime would also need to prevent arbitrage across markets and jurisdictions, and could be designed in a way that ensures market infrastructure practices are not affected.⁸⁷ Indeed, the tools would need to be applied consistently across cleared and uncleared transactions so as to preclude a shift away from central clearing. Authorities also need to be aware of the risks of regulatory arbitrage: if counterparties can avoid the costs of macroprudential margins and haircuts by booking their transactions in a different jurisdiction, the purpose of the tools may be defeated.⁸⁸ Furthermore, the interaction of these tools with existing rules in EMIR would need to be analysed.

To sum up, a successful framework for macroprudential margins and haircuts should build on existing regulatory frameworks, and would need to have broad application covering all relevant transactions by risk-taking entities.⁸⁹ First, it would need to be based on a standardised and transparent model, and be applied on a market-wide basis – i.e. to all relevant derivative and SFT transactions – regardless of whether or not transactions are centrally cleared. Second, macroprudential authorities would need to apply these tools directly to the transactions contracted by all risk-taking entities whose behaviour they seek to affect, regardless of the market, jurisdiction or infrastructure where the transactions were booked. An international agreement similar to the one reached on minimum haircuts for SFTs⁹⁰ would help implement these tools consistently across jurisdictions.

Conclusions and the way forward

This special feature has argued that macroprudential margins and haircuts could be effective tools in limiting the build-up of leverage and the procyclicality of margin and haircut-setting practices in SFT and derivatives markets. The ongoing review of EMIR would provide an opportunity to establish such tools in European legislation, as already proposed by the ECB in its response to the public consultation on the EMIR review in August 2015. Moreover, the Securities Financing Transactions Regulation (SFTR) contains a clause that authorises ESMA, in collaboration with the ESRB and the EBA, to prepare a report, due by October 2016, on the options available to tackle the build-up of leverage in SFT markets and whether further measures to reduce the procyclicality of that leverage are required. The analysis presented suggests that it would be appropriate to implement macroprudential haircuts via the SFTR.

⁸⁷ For example, this may be achieved by requiring CCP participants themselves to ensure they meet macroprudential margin and haircut floors for every transaction they centrally clear.

⁸⁸ As for any macroprudential tool, the implementation of macroprudential margins and haircuts in practice should be accompanied by a cost-benefit analysis.

⁸⁹ It should be recalled that infrastructures such as CCPs act as intermediaries in transactions and are not risk-taking entities themselves.

⁹⁰ Note that the FSB framework already states that numerical haircut floors could in the future be used as a countercyclical macroprudential tool by relevant national/regional authorities.

B Systemic implications of the European bail-in tool: a multi-layered network analysis⁹¹

The new bail-in tool in the EU bank resolution toolkit is an important step forward to safeguard financial stability in Europe, notably in relation to mitigating moral hazard and other problems inherent in a strong reliance on bailouts. At the same time, it is important to understand the potential contagion channels in the financial system following a bail-in and prior to resolution in order to assess potential systemic implications of the use of the bail-in tool. This special feature outlines salient features of the new requirements and then presents a multi-layered network model of banks' bail-inable securities that could help in gauging potential contagion risk and, prior to a resolution, identifying mitigating measures to avoid systemic implications.

Introduction

The new bail-in tool in the bank resolution toolkit embeds many strengths, notably in relation to mitigating moral hazard and other problems inherent in a strong reliance on bailouts. Without a credible resolution option, authorities would have only one option for systemically important institutions: a public bailout, often at huge cost for the taxpayer and with negative consequences for the economy at large. Bailouts create the wrong incentives for internal risk management and a moral hazard problem, as the cost of failure is not borne by those who have taken the risks but by taxpayers. They create an uneven playing field among banks as large and complex banks, which are perceived as more likely to be bailed out, can fund themselves more cheaply than smaller banks. Finally, bailouts create a negative feedback loop between banks and their sovereign. A credible resolution framework including a bail-in tool mitigates these negative externalities, by shifting costs of bank failures from taxpayers to, first and foremost, the shareholders and creditors of the failing bank.

In Europe, the Bank Recovery and Resolution Directive (BRRD) and the Single Resolution Mechanism (SRM) Regulation became fully operational on 1 January 2016. The bail-in tool in the EU bank resolution framework enables the resolution authority to write down and/or convert into equity the claims of a broad range of creditors, according to a predefined creditor hierarchy. The EU bail-in tool is welcome as it contributes to reducing the burden on taxpayers when resolving large, systemic financial institutions and mitigates some of the moral hazard incentives associated with too-big-to-fail institutions. The bail-in tool will, by design, affect other financial institutions that hold bail-inable securities of the bank being resolved. Losses incurred by those institutions may in turn impair their own viability and could therefore have consequences for the wider financial system. These potential second-round effects need to be assessed by the relevant authorities in a timely manner.

⁹¹ This special feature was prepared by Grzegorz Halaj, Anne-Caroline Hüser, Christoffer Kok, Cristian Perales and Anton van der Kraaij.

The multi-layered network model⁹² presented in this special feature allows for the monitoring and quantification of the potential for direct contagion resulting from a bail-in. Using proprietary ECB data, a multi-layered network model is built, where each layer represents the securities cross-holdings of a specific seniority among the 26 largest euro area banking groups. On this basis, the bail-in of a bank can be simulated to identify the risk of direct contagion to the other banks in the network that may suffer losses when their bail-inable securities are written down.

The multi-layered network model presented in this special feature is a useful monitoring tool. The network model is able to assess the size of the potential direct contagion channels due to securities cross-holdings in the network and can also simulate how a bail-in at one bank leads to the rewiring of links within the banking sector, which may give guidance to regulators on the effects of a bail-in on banks' interconnectedness. The network model can therefore help to identify situations where bail-in may entail financial stability risks and enables authorities to ex ante take mitigating measures to reduce the direct contagion risk. Moreover, the tool could help inform policy decisions about the adequacy of capital levels in the system (e.g. capital add-ons under the ECB Supervisory Review and Evaluation Process (SREP) decisions and parameterisation of the leverage ratio), the need for possible restrictions on bail-inable debt cross-holdings by banks and the minimum requirement for own funds and eligible liabilities (MREL) level to be set on a case-by-case basis by the SRM.

The bail-in tool in the EU bank resolution framework

The Single Resolution Board (SRB) can convert to equity, or write down, the principal amount of a wide range of unsecured liabilities of a bank in resolution. The bail-in tool aims to recapitalise a bank in resolution or to provide capital for a bridge institution in case liquidation of the bank is not possible due to the negative externalities for the financial system of a default. For the banking union, the legal basis for the bail-in tool is provided by the SRM Regulation.⁹³

The SRM Regulation provides a hierarchy for the bail-in of creditors and excludes certain liabilities from the scope of the bail-in. The SRM Regulation prescribes that all liabilities of a bank are bail-inable, unless they are specifically excluded. This ensures that the scope of the bail-in tool is as wide as possible, subjecting creditors to market discipline and contributing to an adequate loss-absorption capacity. Secured or collateralised liabilities, including covered bonds, are excluded. Furthermore, in order to protect deposits guaranteed by deposit guarantee schemes and reduce the risk of systemic contagion, the bail-in tool also excludes covered deposits and interbank liabilities with an original maturity of less than seven days. Additionally, under exceptional circumstances certain liabilities may be fully or

⁹² For an overview of the multi-layered financial network literature, see the survey by Hüser, A.-C., "Too interconnected to fail: a survey of the interbank networks literature", *Journal of Network Theory in Finance*, Vol. 1(3), 2015, pp. 1-50.

⁹³ See Article 27 of the SRM Regulation. Similar provisions can be found for the European Union in the BRRD. This special feature focuses on the banking union as the model uses proprietary ECB data.

partially excluded on a case-by-case basis from the bail-in tool for financial stability reasons and to avoid widespread contagion. The hierarchy for the bail-in of creditors follows a creditor waterfall whereby the junior liabilities are bailed in first, followed by the next (more senior) tranches upon depletion of each previous layer.⁹⁴ This waterfall does not affect the liabilities explicitly excluded from bail-in or the possibility for authorities to exempt from bail-in certain liabilities under exceptional circumstances.

Resolution authorities may use the bail-in tool in a resolution, provided that three conditions for resolution are met,⁹⁵ namely that: (i) the bank is assessed by the supervisor or resolution authority to be failing or likely to fail;⁹⁶ (ii) there is no reasonable prospect that any alternative private sector or supervisory measures would prevent the failure within a reasonable time frame; and (iii) a resolution action is necessary from a public interest point of view.

For the network model, a benchmark is needed to assess at which capital level a bank would be considered to be failing or likely to fail. In the simulation exercise, the benchmark level of capital is assumed to be common equity Tier 1 (CET1) of 7%. EU legislation does not provide for quantitative thresholds to determine whether a bank is failing or likely to fail (FLTF). Instead such determination is left to the supervisor or resolution authority. In accordance with European Banking Authority (EBA) Guidelines⁹⁷, the supervisor should primarily base its determination of whether or not these failing or likely to fail conditions are met on the outcomes of the SREP, including a comprehensive assessment of both qualitative and quantitative elements reflecting the bank's capital and liquidity positions and other requirements for authorisation to continue. One possible threshold would be a CET1 ratio of 4.5%, reflecting that buffers and other capital to meet Pillar 1 and Pillar 2 requirements are depleted. A more conservative assumption would be that a bank is determined to be failing or likely to fail when a bank has depleted its buffers and for instance half of its Pillar 2 capital add-on, suggesting that breaches of Pillar 2 requirements may be grounds for a withdrawal of authorisation and thus a failing or likely to fail assessment.⁹⁸

Chart B.1 below presents a stylised example of loss absorption and recapitalisation after a bail-in. In the first step, a bank experiences a loss of nine units on its assets side and, as a consequence, breaches the assumed threshold triggering a bail-in. In a second step, its liabilities side is therefore written down to

⁹⁴ See Article 17 of the SRM Regulation.

⁹⁵ See Article 18 of the SRM Regulation.

⁹⁶ The failing or likely to fail assessment is based on the expert judgement of the supervisor (or the resolution authority in certain circumstances) that the bank will not meet the requirements for authorisation or is likely to be insolvent or illiquid in the near future. Moreover, any provision of public support, subject to exceptions, will result in the determination that the bank is failing or likely to fail. See Article 18(4) of the SRM Regulation.

⁹⁷ EBA Guidelines on the interpretation of the different circumstances when an institution shall be considered failing or likely to fail under Article 32(6) of Directive 2014/59/EU (EBA/GL/2015/07 dated 26 May 2014).

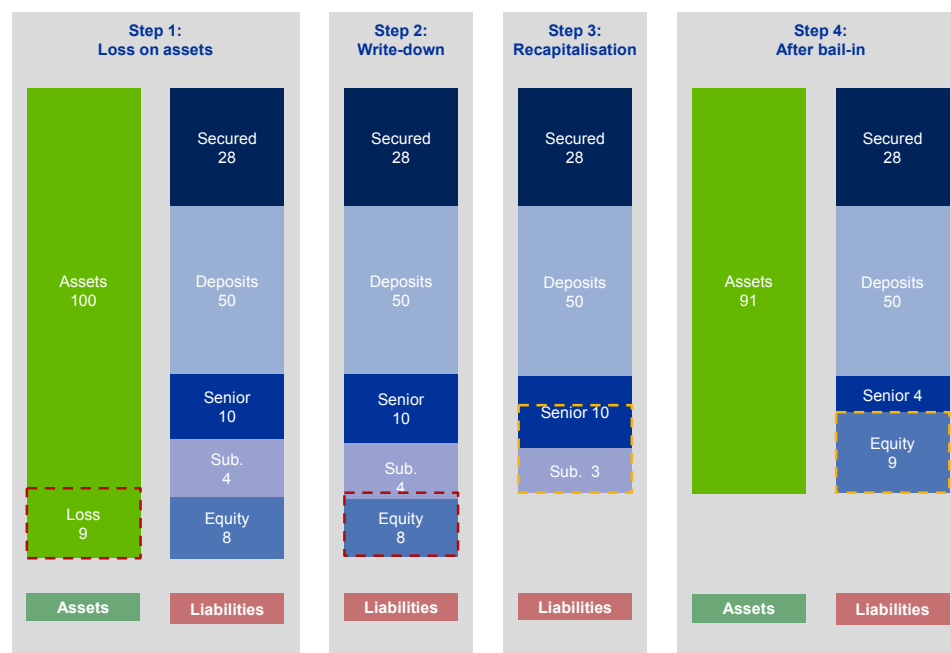
⁹⁸ See Article 18(4)(a) and recital 57 of the SRM Regulation. This would put the threshold at $4.5\% + 1/2 * (9.9\% - 4.5\%) = 7.2\%$ CET1; see the [SSM SREP Methodology Booklet](#) published on 19 February 2016. For this analysis, the threshold is rounded down to 7% CET1.

absorb the losses. In this example, the entire equity and part of the subordinated debt is lost. In a third step, the bank will be recapitalised to 10.5% CET1.⁹⁹ The recapitalisation requires new equity of roughly nine units: the entire subordinated debt and a fraction of the senior unsecured debt need to be bailed in. The final step illustrates the balance sheet of the bank after the bail-in.

Chart B.1

In a bail-in, shareholders and creditors contribute to the loss absorption and recapitalisation of the bank under resolution

Stylised example of loss absorption and recapitalisation after a bail-in



Note: Block sizes are not to scale.

Authorities have defined minimum loss-absorbency standards for banks' liabilities that should be readily available for bail-in.

These standards require specific types and levels of equity and debt liabilities to be readily available to absorb losses and recapitalise institutions entering resolution in order to avoid that banks structure their liabilities in a manner that undermines the effectiveness of the bail-in tool (e.g. by moving from an unsecured funding to a secured funding basis). Within the European Union, the MREL standard has been set with this in mind. At the global level, the Financial Stability Board's total loss-absorbing capacity (TLAC) standard defines a requirement for liabilities that should be readily available for the bail-in of global systemically important banks (G-SIBs).

MREL and TLAC take different approaches to establishing a minimum level of loss absorbency for banks.¹⁰⁰ TLAC establishes a common minimum Pillar 1

⁹⁹ For simplicity, it is assumed that the 7% is based on total assets and not on risk-weighted assets. This assumption is relaxed in the subsequent sections.

¹⁰⁰ See *Financial Stability Review*, ECB, November 2014, Box 6, for the key differences between TLAC and MREL. The BRRD provides for an MREL review in 2016 to ensure inter alia consistency with the minimum requirements relating to any international standards developed by international fora.

requirement of 16% (18% as from 2022) of risk-weighted assets (RWAs) and at least 6% (6.75% as from 2022) of the Basel III Tier 1 leverage ratio requirement as a floor for all G-SIBs, with the possibility for authorities to top it up on an individual basis with a Pillar 2 component.¹⁰¹ MREL, on the other hand, can be considered a Pillar 2 requirement, as its level is set on an individual and case-by-case basis. The difference in approach between TLAC and MREL is to a certain extent understandable, as TLAC applies to a relatively homogeneous group (G-SIBs), whereas MREL applies to all banks.

MREL and TLAC both include measures to mitigate the risk of contagion upon the bail-in of creditors, although the approaches again differ.

The TLAC standard includes a requirement that provides disincentives for banks to hold TLAC instruments issued by other banks. G-SIBs must deduct exposures to eligible external TLAC liabilities issued by other G-SIBs from their own TLAC or regulatory capital exposures in a manner generally parallel to the existing provisions in Basel III for the deduction of regulatory capital of other banks. Similar provisions for non-G-SIBs are also envisaged by the Financial Stability Board (FSB) and the Basel Committee on Banking Supervision (BCBS).¹⁰² The SRM Regulation does not contain a similar deduction requirement for holdings of MREL. It is however noteworthy in this respect that without prejudice to the existing large exposure regime, the SRB can instruct national resolution authorities to limit the extent to which other institutions hold liabilities eligible for the bail-in tool, except for liabilities held at entities that are part of the same group.¹⁰³ This is one of a set of powers at the disposal of resolution authorities to mitigate any impediments to the resolvability of a bank.¹⁰⁴ In Europe, pending the implementation of the FSB standard into EU legislation, the legislator thus prefers a discretionary case-by-case approach by the SRB or national resolution authorities to mitigate contagion risk in a bail-in scenario over a general requirement across all banks.

Resolution authorities will decide on the level of capital necessary following a bail-in.

The decision on the appropriate capital level will be based on qualitative criteria and expert judgement as the EU legal texts do not stipulate a specific level of recapitalisation. The bail-in tool will be used to recapitalise a failing bank to a level sufficient to restore its ability to comply with the conditions for authorisation and to continue to carry out the activities for which it is authorised, and to sustain sufficient market confidence in the institution or entity.¹⁰⁵ Criteria for the target level of recapitalisation are further detailed by draft EBA Regulatory Technical Standards (RTS) for the determination of the level of MREL.¹⁰⁶ These draft RTS prescribe that resolution authorities should aim to set a level of MREL sufficient to ensure that

¹⁰¹ See *Principles on Loss-absorbing and Recapitalisation Capacity of G-SIBs in Resolution*, Financial Stability Board, 9 November 2015. The minimum TLAC level mentioned will be phased in over the period from 1 January 2019 to 1 January 2022.

¹⁰² See "TLAC Holdings", BCBS Consultative Document, November 2015.

¹⁰³ See Article 27(4) of the SRM Regulation.

¹⁰⁴ See Article 10 of the SRM Regulation.

¹⁰⁵ See Article 27(1) of the SRM Regulation

¹⁰⁶ See the EBA final draft Regulatory Technical Standards on criteria for determining the minimum requirement for own funds and eligible liabilities under Directive 2014/59/EU (EBA/RTS/2015/05 dated 3 July 2015). These RTS have been submitted to the European Commission and are not yet in force.

following a bail-in, the institution can: (i) absorb losses sufficient to exhaust capital requirements and buffers; (ii) satisfy capital requirements applicable after the implementation of the preferred resolution strategy; and (iii) match average capitalisation levels for a defined peer group in order to restore market confidence.

In addition to the recapitalisation capacity provided by the bail-in of creditors, the Single Resolution Fund (SRF) may contribute to the recapitalisation of the failing bank. The SRF contribution is subject to a number of strict conditions including the requirement that losses totalling not less than 8% of total liabilities including own funds have already been absorbed by creditors of the failing bank through the use of the bail-in tool.¹⁰⁷

A multi-layered network approach to monitoring contagion risk in relation to bail-in

Each of the four layers in the multi-layered network represents the securities cross-holdings of a specific seniority of the largest Single Supervisory Mechanism (SSM) banking groups. In order to gauge and regularly monitor the potential direct contagion risks related to the bail-in of a significant institution within the SSM area, a multi-layered network tool is constructed based on proprietary ECB data covering the securities holdings of the 26 largest euro area banking groups.¹⁰⁸ The corresponding liability structure is derived using supervisory data. All the data refer to the first quarter of 2015.

The network is based on two micro-financial datasets. For banks' holdings of bail-inable debt issued by other banks in the network, the Securities Holdings Statistics (SHS) and data from the Centralised Securities Database (CSDB) are used. From the SHS data it is possible to identify all the cross-holdings of debt securities and quoted shares among the sample of 26 SSM banking groups included in this dataset. These 26 banking groups represent 59% of total euro area banking sector assets. Combining the SHS data with the CSDB data allows us to obtain information on the type of debt and the seniority, which in turn permits us to accurately assess the exposure of individual banking groups to bail-inable instruments issued by other banking groups. Based on these datasets, four securities cross-holding networks differentiated by the seniority of the security are built, for equity, subordinated debt, senior unsecured debt and secured debt. Equity issued by a bank in the network and held by other banks in the network on average amounts to 0.1% of total assets of the issuing bank. Subordinated debt and senior unsecured debt issued to banks in the network represent 0.01% and 0.6% of total assets, respectively. The average cross-holdings are thus very low. The counterparties' liability structure is derived from quarterly balance sheet data from ECB supervisory statistics. The model set-up is illustrated in **Chart B.2**.

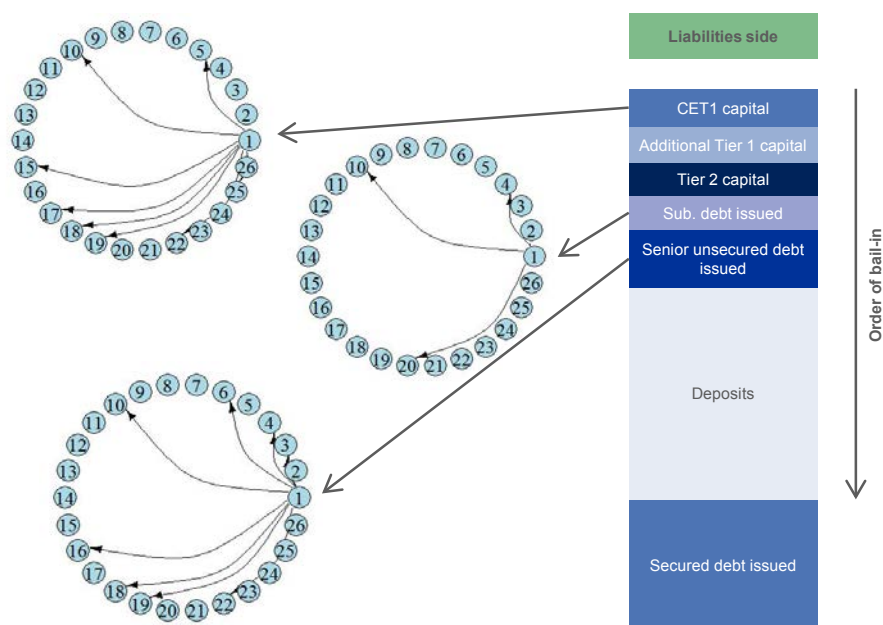
¹⁰⁷ See Article 8 of the SRM Regulation.

¹⁰⁸ The largest as measured by total assets.

Chart B.2

Stylised liabilities side of a hypothetical bank 1 in the network model

Creditor hierarchy in a bail-in and potential direct contagion channels from bank 1 to its counterparties in several network layers¹⁰⁹



Notes: The large circles represent the network of 26 banks. The smaller circles represent the individual banks in the network. The arrows point from a specific seniority layer on bank 1's liabilities side to the network of cross-holdings of that seniority layer. Within the networks, arrows point from bank 1 to its counterparties in the network. Block sizes and arrows within the network are not to scale.

In the baseline scenario, a bank is put into resolution after an idiosyncratic shock to the bank's assets and the impact on that bank's counterparties is computed. The effects of a bail-in within this multi-layered network of large euro area banking groups are then simulated. In the baseline scenario, a bank is hit by an idiosyncratic shock amounting to 5% of total assets.¹¹⁰ This loss is deducted from the bank's external assets and if the loss results in a breach of the assumed 7% CET1 resolution threshold, a bail-in is simulated. In order to absorb the loss, equity and debt will be written down in accordance with the creditor hierarchy (see **Chart B.2**). After the loss absorption, the bank will be recapitalised to 10.5% CET1.¹¹¹ The claims of shareholders (if there is remaining equity) and then creditors' claims (both inside and outside the network) are converted into CET1 capital in order to reach the required level of capital. If no shareholders are left, then creditors are given a share in the institution in proportion to the amount they contributed to the recapitalisation. If

¹⁰⁹ Covered deposits are excluded from the scope of the bail-in tool. See Article 27(3) of the SRM Regulation. These deposits are protected up to the coverage level of the deposit guarantee system (DGS) of €100,000. However, the DGS contributes to funding the resolution process by absorbing losses to the extent of the net losses that it would have had to suffer after compensating depositors in normal insolvency proceedings (Article 79 of the SRM Regulation).

¹¹⁰ The shock size for the baseline scenario is based on the historical losses from the recent crisis. See *Historical Losses and Recapitalisation Needs: Findings Report*, Financial Stability Board, November 2015, Table 1.

¹¹¹ The 10.5% is based on the average SREP CET1 requirements of significant institutions, which are around 9.9%; see the *SSM SREP Methodology Booklet* published on 19 February 2016. 50 basis points are added to reflect that banks typically operate with a margin above their prudential requirements.

there are still shareholders left, their shares get diluted as the creditors whose loans were converted into equity also get a share of the resolved bank. Both the write-down and the recapitalisation imply asset losses for shareholders and creditors of the affected bank. To analyse the direct contagion effects, if one or several other banks in the network go below the 7% CET1 ratio assumed as the resolution and bail-in threshold after the initial bail-in, these banks will also be bailed in. In turn, this may trigger asset losses at further counterparties. The direct contagion cascade continues as long as there are banks breaching the resolution and bail-in threshold after a simulated bail-in.

The adverse scenario simulates a bail-in in an already weakened financial system. All banks in the network are in a first step subject to a macroeconomic shock¹¹² affecting their current CET1 levels that corresponds to the adverse scenario of the ECB's 2013-14 comprehensive assessment. In a second step, the weakened system is subjected to the baseline scenario, where one bank at a time is hit by a 5% shock and is bailed in. The procedure is repeated for a thousand draws of the macroeconomic shock, which means that the adverse scenario is simulated a thousand times for each of the 26 banks.

Is the banking system resistant to contagion from the bail-in of a significant institution?

The baseline and adverse scenarios are useful for illustrating how resilient the banking system is to direct contagion when a significant institution is put into resolution and its debt is bailed in. Applying the multi-layered network model, it is straightforward to calculate the effects on other financial institutions holding bail-inable debt of the institution put into resolution. For confidentiality reasons, individual bank-level results are not displayed. To generate the charts, bank-level results were sorted¹¹³ in ascending order and the banks were then grouped into groups of at least three, which yielded eight bank clusters for which the average results are displayed.

In the baseline scenario of an idiosyncratic bail-in, the impact on the equity ratios of the counterparties of a bailed-in bank is very small, even though in most cases senior unsecured creditors are hit. Focusing first on the baseline scenario, **Chart B.3** shows the decline in CET1 ratios across groups of the 25 other banks in the sample in the case of a bail-in of an individual significant institution. While under this scenario the direct contagion effects of the bail-in on the other banks' CET1 capital are overall very limited, in a few cases contained but still non-negligible effects are observed. The limited effect is largely due to the low levels of securities cross-holdings among the 26 banks. The analysis shows that in all cases subordinated creditors are affected. For the senior unsecured creditors, losses range

¹¹² Each bank is hit by a shock of a different magnitude but generated from the same distribution. The size of the shock is drawn from a normal distribution that is truncated from minus infinity to zero and that has a mean of 0.24 and a standard deviation of 0.09. Thereby, it is possible to match the mean (-2.8 basis points) and the standard deviation (3.3 basis points) of the CET1 capital loss of SSM banks in the adverse scenario of the ECB's 2013-14 comprehensive assessment.

¹¹³ The sorting implies that groups do not necessarily represent the same banks across charts.

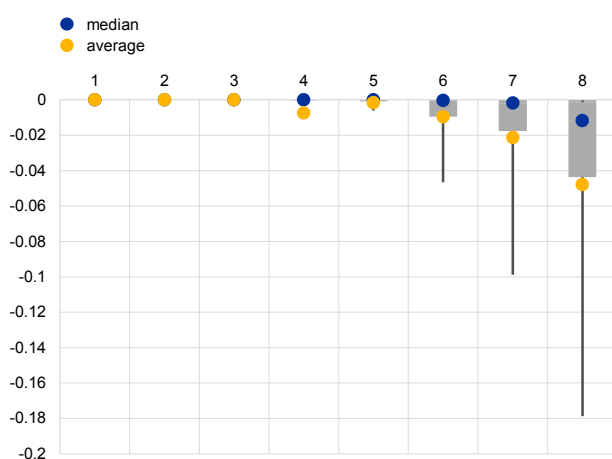
between zero and 40%, with one outlier, where the senior unsecured layer is exhausted and the bail-in hits the deposit layer.

Chart B.3

Equity ratios decrease only marginally at counterparties of a bailed-in bank

Decrease in CET1 ratios in the baseline scenario

(percentage point decrease of CET1 ratios at counterparties after 26 bail-in simulations; 10th and 90th percentiles, interquartile distribution, average and median)



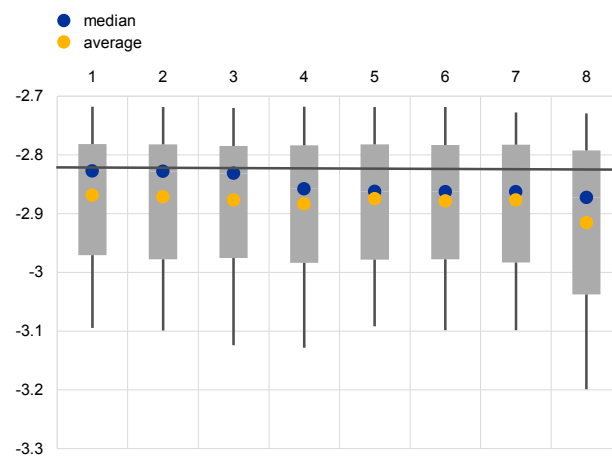
Source: ECB (Securities Holdings Statistics and supervisory data).

Chart B.4

Conditional on an adverse shock, a bail-in leads to higher losses at counterparties

Decrease in CET1 ratios in the adverse scenario

(average percentage point decrease of CET1 ratios at counterparties after 26 times a thousand bail-in simulations; 10th and 90th percentiles, interquartile distribution, average and median; the black line indicates the mean of the initial common shock to the CET1 ratio)



Source: ECB (Securities Holdings Statistics and supervisory data).

In an augmented set-up, interbank debt is incorporated as a potential additional direct contagion channel. Banks are not only connected via securities cross-holdings, but also via the interbank market. Unsecured interbank debt that has a maturity over seven days is also subject to bail-in. In order to perform a comprehensive analysis of the potential for direct contagion after a bail-in, the baseline scenario is run in a set-up where nominal interbank exposures are added to the securities cross-holdings network. The information on individual banks' interbank lending and borrowing was extracted from the ECB supervisory data. Both the quantitative and the qualitative features of [Chart B.3](#) remain in this augmented set-up.

In the adverse scenario, the bail-in of a bank has a somewhat stronger impact on its counterparties in the network. After the common shock, the banking sector as a whole is already in a weakened solvency position, with an average decline of 2.8 percentage points in the CET1 ratios at the counterparties of the bank under resolution. The simulation of the baseline scenario in the weakened system results in a stronger decline in the CET1 ratio at counterparties (on average around 8 basis points, see [Chart B.4](#)) compared with the simulation of the baseline scenario without a prior common shock (on average 1-2 basis points; see [Chart B.3](#)). Furthermore, in the adverse scenario, some heterogeneity is observed across banks in terms of the immediate bail-in effects on the rest of the banks' CET1 ratios.

The loss-absorption capacity mostly resides with holders of bail-inable bank debt outside the network of the 26 largest SSM banking groups. On average,

senior unsecured debt securities issued by a bank within the network and held within the network as a percentage of the total nominal amount of securities issued by that bank in the senior unsecured layer amounts to only 5%. For subordinated debt the average ratio is 0.6% and for equity cross-holdings the average ratio is 2%. Therefore, the potential for contagion lies mostly outside the network of 26 banks.

Concluding remarks

Three main findings are evident from the simulations and analysis performed.

First, resolution authorities will need to continue to ensure the current low level of interbank cross-holdings of bank bail-inable debt in the network as they appear to prevent contagion. For the shock sizes considered, the direct contagion effect on banks within the network considered is subdued due to the low cross-holdings of bank bail-inable debt within the network. This shows the effectiveness in limiting contagion of low interbank cross-holdings of bail-inable debt, TLAC and MREL in particular, and the advantage of the policy option to strongly disincentivise interbank TLAC holdings as envisaged by the FSB and BCBS.

Second, the composition and level of loss-absorbing capacity should be set for each bank on a case-by-case basis. The analysis shows that in all cases subordinated creditors are affected. For the senior unsecured creditors, losses range (in the vast majority of cases) between zero and 40%. This shows that the composition and level of MREL need not be uniform across the banking system. Instead, MREL should be set taking into account the resolution strategy, the business model and specificities of the bank in question.

Third, the loss-absorption capacity mostly resides with holders of bail-inable bank debt outside the network of the 26 largest SSM banking groups. This finding is in accordance with the principle that a wide distribution of bail-inable instruments outside the banking sector is preferable. In turn, this underpins the proposal by the BCBS to provide disincentives for smaller international banks' holdings of G-SIB TLAC instruments to mitigate contagion.

Finally, it should be highlighted that the presented results are likely to underestimate the contagion risk. First, the analysis only considers one bank bail-in at a time; more pronounced contagion effects could be envisaged in cases where two or more banking groups are bailed in simultaneously. Second, the exercise is restricted to the pure network effects, so any confidence-driven and second-round indirect contagion effects that are likely to occur in the context of a bail-in of any of the 26 banks in the sample are not captured.

C Recent trends in euro area banks' business models and implications for banking sector stability¹¹⁴

This special feature reviews recent trends in business model characteristics, discusses their relationship with bank stability and performance, and looks at how this relationship has changed over time, comparing the period before the crisis with the crisis years and the current situation.

Key trends in banks' business activities since the financial crisis

The financial crisis and new regulatory requirements have had a profound impact on banks' activities and business models. Pre-crisis profitability levels of many banks were boosted by high leverage and/or reliance on relatively cheap wholesale funding as well as, in some cases, elevated risk-taking (such as real estate lending or securitisation exposures) in order to generate revenues. Changes in banks' behaviour and in the regulatory framework have rendered some of the (previously) most profitable business strategies less viable which, coinciding with weak macroeconomic and financial market conditions, has led to deteriorating financial performances since the crisis. Accordingly, banks' return to sustainable profitability and thus banking sector stability will depend on their ability to adapt their business mix to the new operating environment.¹¹⁵ By the same token, business model challenges and profitability risk have been identified by ECB Banking Supervision as being high-level microprudential priority risks for 2016.¹¹⁶

In response to these challenges, in the past few years banks have made substantial efforts to reshape their business models. Business model adjustments have been driven by at least three factors. First, the regulatory reforms implemented in the wake of the crisis have materially affected business models by requiring bank balance sheets to contain more high-quality capital, liquid assets, bail-inable debt and more stable funding sources. More specifically, regulation has made certain business lines more costly (in particular, trading activities), leading a number of banks to scale down these types of activity. Furthermore, some of the new regulations (such as the Bank Recovery and Resolution Directive and structural bank reforms) will have a direct impact on business models, by forcing banks to adapt their operating structures to new requirements. In addition, some business model changes have been triggered by conditions laid down in the restructuring plans of banks that received state aid, which often required affected banks to focus on more traditional banking activities. Second, banks have also implemented (or are still implementing) changes to their business models to respond to market pressures

¹¹⁴ This special feature was prepared by Christoffer Kok, Csaba M3r3 and Monica Petrescu, with contributions from Fabio Franch, S3ndor Gard3, Benjamin Klaus and Dawid Źochowski.

¹¹⁵ See, for example, the special feature by Kok, C., M3r3, C. and Pancaro, C. entitled "Bank profitability challenges in euro area banks: the role of cyclical and structural factors", in *Financial Stability Review*, ECB, May 2015. See also Halaj, G. and Źochowski, D., "Strategic groups and banks' performance", *Journal of Financial Theory and Practice*, Vol. 33, Issue 2, 2009, pp. 153-186; and Roengpitya, R., Tarashev, N. and Tsatsaronis, K., "Bank business models", *BIS Quarterly Review*, December 2014.

¹¹⁶ See *ECB Banking Supervision: SSM Priorities 2016*, ECB, January 2016.

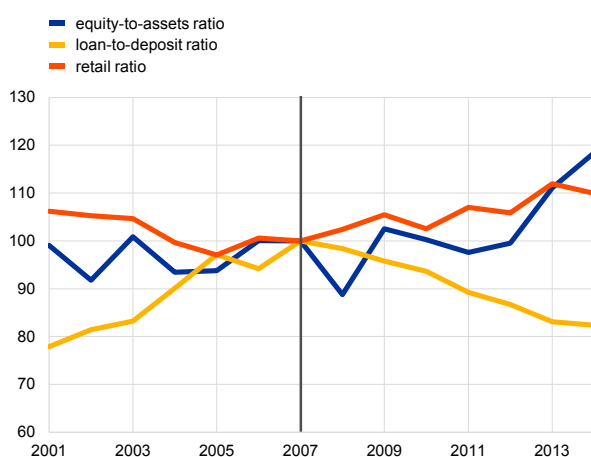
from investors. As an example, some banks have exited low-margin activities to boost returns. Third, business model changes may, to some extent, also reflect banks' own initiatives on account of their altered risk-return preferences.

Chart C.1

Shift in EU banks' business models since the crisis to lower leverage, reduced reliance on wholesale funding and higher reliance on retail activities

Changes in EU significant banking groups' key business model characteristics after the crisis

(2001-14; index: 2007=100)



Sources: Bloomberg, SNL Financial and ECB calculations.

Notes: The index is based on the median value for each indicator. The retail ratio is calculated as the ratio of customer deposits plus (net) customer loans over total assets.

As a result, euro area banks have scaled back their activities in several areas that involved higher risk-taking, while strengthening core business activities.

While the analysis presented in this special feature suggests that bank business models (and their impact on bank risk) tend to be rather stable, since the crisis a number of key trends shaping banks' business activities and strategies can be identified. These are outlined below.

Shift towards retail businesses from investment banking and wholesale lending activities:

Looking at the evolution of business models over time, retail banking appears to have gained ground post-crisis, reversing a pre-crisis trend. This is also indicated by the gradual increase in banks' retail ratio since the crisis (see **Chart C.1**). This trend is likely to continue in the next few years. For instance, the results of the European Banking Authority's June 2015 risk survey show that retail activities are among the business lines most frequently mentioned by banks as an area they are planning to expand.¹¹⁷ This trend reflects both a shift towards retail funding and a reduction in non-retail

assets. In particular, several large banks have downsized certain investment banking activities as well as legacy securitisation exposures that were particularly affected by new regulatory requirements. Banks have also scaled down some wholesale lending activities (e.g. international leasing, trade finance and shipping) as well as certain lending activities in higher-risk sectors (e.g. commercial real estate).¹¹⁸

Reduced leverage and wholesale funding: Before the crisis, euro area banks were more highly leveraged, on average, than their global peers – although some of this was related to prevailing institutional settings such as mortgage balance sheet retention and differences in accounting standards (in particular the different treatment of derivatives under IFRS and US GAAP). After the crisis, banks' adjustment to higher capital requirements has contributed to lower leverage (see **Chart C.1**). In a similar vein, new regulatory requirements and the increased cost of wholesale funding have pushed EU banks to reduce their over-reliance on wholesale funding sources, as indicated by the steady decline in the loan-to-deposit ratio.

Some retrenchment in foreign activities: As part of the shift towards core business activities, a number of EU banks have reduced their international presence

¹¹⁷ See *Risk assessment of the European banking system*, European Banking Authority, June 2015.

¹¹⁸ See also Box 5 entitled "Deleveraging by euro area banks", in *Financial Stability Review*, ECB, May 2013.

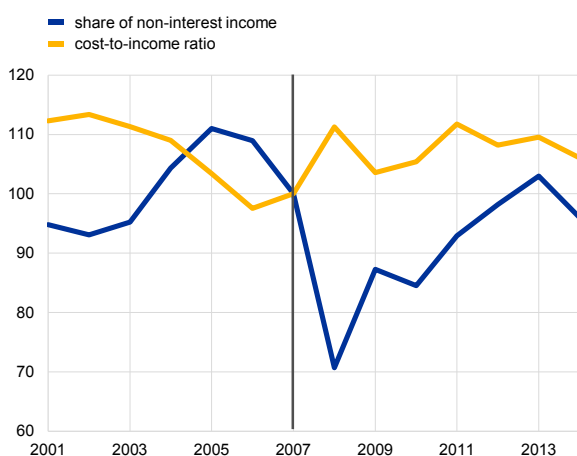
by selectively withdrawing from non-core markets. This has involved the reduction of both intra-euro area exposures, in particular to countries most affected by the sovereign debt crisis, and of extra-euro area exposures, for instance those relying on foreign currency-denominated funding (e.g. in Asia and the United States). This notwithstanding, some banks have sought to selectively increase their foreign presence, possibly also reflecting limited growth opportunities in domestic markets.

Chart C.2

Income diversification gradually increased compared with crisis lows, while cost efficiency did not show any improvement in the post-crisis period

Changes in EU significant banking groups' non-interest income share and cost-to-income ratio after the crisis

(2001-14; index: 2007=100)



Sources: Bloomberg, SNL Financial and ECB calculations.
Note: The index is based on the median value for each indicator.

Income diversification and cost efficiency: Since the crisis, many EU banks may have sought to maintain or improve profitability by diversifying their income sources and better managing their cost base. Thus, following a significant drop in the share of non-interest income (largely owing to trading losses), this share gradually increased, bringing it back close to pre-crisis levels (see **Chart C.2**). In the same period, the composition of non-interest income has shifted from more volatile trading income towards fee and commission income. A number of banks have also implemented restructuring plans since the crisis, aiming to reduce operational costs. These plans involve branch network rationalisation and headcount reductions. Nevertheless, largely due to low income growth EU banks' cost-to-income ratio, on average, remains above pre-crisis levels (see **Chart C.2**). Furthermore, significant differences remain across banks and countries in terms of cost efficiency, as indicated by the wide range of cost-to-income ratios across euro area countries in 2015 (from 43% to 70%).¹¹⁹

A push towards less complex banking groups: Certain aspects of regulation intended to make the system more resilient – by reducing too-big-to-fail risk – may diminish the benefits of economies of scale as they entail additional costs for large and complex banking groups (for instance global systemically important institution (G-SII) buffers and total loss-absorbing capacity (TLAC) requirements). In addition, several large banks incurred significant costs as a consequence of past misconduct, mainly related to their investment banking operations (see **Box 1**). As a response to the increasing regulatory costs and other costs of complexity, some banks are endeavouring to rationalise their strategies by focusing on business activities/geographical regions in which they have sufficient economies of scale and better profit margins.

¹¹⁹ Based on data for the first three quarters of 2015. Notably, the cost-to-income ratio is only one, simplistic metric and hence deductions about bank efficiency using this measure only should be interpreted with caution.

Business model implications for bank stability

In view of these trends, it is important to understand what implications business model characteristics have for banks' overall riskiness. In the context of changing regulation and large-scale restructuring after the financial crisis, increased attention has been devoted to identifying the nature of risk attached to different bank activities. While it can be difficult to disentangle the effect of individual balance sheet features, existing empirical studies suggest that banks' business models can have substantial stability implications.

A number of factors related to business model structures can affect bank default risk. For instance, funding structure is a business model feature commonly found to have risk implications: higher reliance on deposits is associated with lower bank risk, while reliance on wholesale funding is associated with higher risk, though, importantly, the effect may differ by bank type.¹²⁰ Income structure is another potential business model determinant of bank riskiness. Some findings suggest that banks with more diversified income structures were less risky during the crisis, and that diversification raises their distance to default even though it increases the volatility of returns.¹²¹ Non-interest income indicates diversification as it can be derived not only from payment services, but also from engagement in a variety of activities such as trading, market-making and capital market services such as underwriting or securitisation. Cost structures may also affect risk. Some studies suggest that banks that are less cost-efficient tend to have lower distance to default.¹²² Findings regarding the implications of bank size for banks' probability of default are ambiguous overall. Some findings suggest that large banks are less stable¹²³, but others that they are more stable in the long run.¹²⁴ Corporate governance (e.g. ownership structure) may also affect bank risk. Notably, some studies find that depending on the prevalence of financial safety nets and explicit (or implicit) government guarantees, more shareholder-friendly governance structures may encourage bank risk-taking.¹²⁵ **Box 2** illustrates how such bank-specific features can be used to cluster banks into different business model groupings.

Business model features related to risk are often correlated: banks more reliant on deposit funding are smaller, have less non-interest income and make traditional

¹²⁰ See, for example, Altunbas, Y., Manganelli, S. and Marques-Ibanez, D., "Bank risk during the financial crisis: do business models matter?", *Working Paper Series*, No 1394, ECB, 2011; Blundell-Wignall, A., Atkinson, P. and Roulet, C., "Bank business models and the Basel system", *OECD Journal: Financial Market Trends*, Vol. 2013(2), 2014, pp. 43-68; and Prabha, A. P. and Wihlborg, C., "Implicit guarantees, business models and banks' risk-taking through the crisis: Global and European perspectives", *Journal of Economics and Business*, Vol. 76, 2014, pp. 10-38.

¹²¹ See, for example, Altunbas, Y., Manganelli, S. and Marques-Ibanez, D. (op. cit.); 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.

¹²² See Prabha, A. P. and Wihlborg, C., op. cit.

¹²³ See Köhler, M., op. cit.; and Altunbas, Y., Manganelli, S. and Marques-Ibanez, D., op. cit.

¹²⁴ See Mergaerts, F. and Vander Vennet, R., "Business models and their impact on bank performance: a long-term perspective", *Working Papers*, Faculty of Economics and Business Administration, Ghent University, No 15/908, 2015.

¹²⁵ For a review, see Laeven, L., "Corporate governance: What's special about banks?", *Annual Review of Financial Economics*, Vol. 5, 2013, pp. 63-92.

bank loans, while banks more reliant on wholesale funding are more involved in trading and capital market activities, are larger and have higher costs.¹²⁶

This special feature empirically explores the relationship between business models and default risk for euro area banks. To empirically assess the impact of banks' business model characteristics on bank stability, a dynamic panel model for a large set of euro area banks is employed. The analysis covers bank-level data for 143 euro area banking groups over the period 1995-2014.¹²⁷ The linear dynamic panel regression model is given by:

$$y_{it} = \alpha y_{it-1} + \beta X_t + u_i + \varepsilon_{it} \quad (1)$$

where the dependent variable y_{it} is a measure of bank risk for bank i in period t , y_{it-1} is the lagged dependent variable, and X_t is a $(1 \times m)$ vector of explanatory variables including bank-specific characteristics, macroeconomic and financial conditions, and structural market features. The empirical approach is based on system generalised method of moments (GMM) estimators to properly account for endogeneity.¹²⁸

In this analysis, the employed measure of bank risk is the so-called “z-score”, which captures the bank’s distance to default (i.e. a lower value indicates higher risk). In this analysis, an accounting-based z-score is used.¹²⁹ The z-score is defined here as the sum of the return on assets and the equity-to-assets ratio over the standard deviation of return on assets (computed using a five-year moving window). In the base case specification (model 1), the z-score¹³⁰ is regressed on its own lagged variable and a number of bank-specific business model characteristics, including the retail ratio, an efficiency measure (cost-to-income ratio), a measure of income diversification (non-interest income over total revenue), a leverage ratio (equity-to-assets ratio) and size (the logarithm of total assets).¹³¹

The results of the base case regression are shown in column (1) of **Table C.1**. It is observed that the lagged dependent variable is a positive and significant regressor, which suggests persistence of bank riskiness over time. Over the full sample period, larger banks and more retail-oriented banks (measured by the retail ratio) are

¹²⁶ See Ayadi, R. and De Groen, W. P., “Banking Business Models Monitor 2015: Europe”, 2015; and Roengpitya, R., Tarashev, N. A. and Tsatsaronis, K., op. cit.

¹²⁷ The banking data are taken from Bankscope, Bloomberg and SNL Financial.

¹²⁸ 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 estimator is employed to address this issue and to tackle the possible endogeneity of the bank-specific explanatory variables owing to their possible correlation with the error term. Hence, equation (1) is estimated using a system GMM estimator that combines the regression in differences with the regression in levels. In this context, the explanatory variables are instrumented by using “internal” instruments.

¹²⁹ Alternatively, a z-score based on market prices could be used, but owing to superior data availability for this analysis the accounting-based z-score was the preferred measure.

¹³⁰ Owing to the fact that the distribution of z-scores is highly skewed, the natural logarithm of the measure is used in the empirical analysis; see, for example, Laeven, L. and Levine, R., “Bank governance, regulation and risk taking”, *Journal of Financial Economics*, Vol. 93, 2009, pp. 259-275; and Köhler, M., op. cit.

¹³¹ In addition, lagged loan growth (bank-specific) and the Herfindahl-Hirschmann concentration index (HHI) for national banking sectors are included as control variables, alongside three country-specific macroeconomic variables, namely real GDP growth, inflation and the short-term interest rate.

associated with lower default risk. Likewise, banks with more diversified income sources and more cost-efficient banks are generally less risky. As would be expected, better-capitalised banks have lower default risk.¹³²

Table C.1

Regression results – determinants of euro area banks' distance to default, 2000-14

		(1)	(2)	(3)		
	Lagged z-score	0.669*** (0.132)	0.623*** (0.0933)	0.601*** (0.097)		
Bank-specific factors	Bank size	0.495** (0.228)	Pre-crisis	0.268** (0.117)		
			Crisis/post-crisis	0.147 (0.107)		
	Retail ratio	0.239 (0.584)	Pre-crisis	-0.283 (0.581)	G-SIBs	1.343** (0.575)
			Crisis/post-crisis	0.425 (0.499)	Other banks	-0.159 (0.458)
	Income diversification	0.040** (0.017)	Pre-crisis	-2.528*** (0.674)	G-SIBs	-1.772*** (0.505)
			Crisis/post-crisis	0.042*** (0.013)	Other banks	0.051*** (0.013)
	Cost efficiency	-0.143* (0.080)	Pre-crisis	-1.420** (0.621)	G-SIBs	-0.899*** (0.278)
			Crisis/post-crisis	-0.113* (0.063)	Other banks	-0.094** (0.043)
	Short-term borrowing over total assets	0.985 (0.709)	Pre-crisis	0.686 (0.481)	G-SIBs	2.464*** (0.788)
			Crisis/post-crisis	0.431 (0.535)	Other banks	-0.161 (0.607)
Leverage (equity-to-asset ratio)	0.276*** (0.052)		0.201*** (0.051)	0.223*** (0.051)		
Loan growth (lagged)	-0.008 (0.042)		-0.009 (0.039)	-0.038 (0.025)		
Structural factors	Herfindahl-Hirschmann concentration index	-2.000 (3.745)	-3.614 (3.326)	-1.191 (3.042)		
Macroeconomic factors	Real GDP growth (%)	0.085*** (0.028)	0.022* (0.011)	0.055*** (0.019)		
	Inflation	0.008 (0.053)	-0.066*** (0.022)	-0.042 (0.043)		
	Short-term interest rate	-2.929** (1.297)	-0.019 (0.027)	0.023 (0.092)		
	chi2	3295	341.0	7681		
	Hansen p-value	0.094	0.028	0.148		
	AR(2) p-value	0.704	0.382	0.568		
	Number of observations	1007	1007	1007		

Source: ECB.

Notes: Heteroskedasticity and autocorrelation robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The Hansen test of over-identifying restrictions confirms that the (internal) instruments are valid, and the Arellano-Bond test rejects significant second-order serial correlation in the error term. The Wald test indicates that all the estimated coefficients are jointly significant.

Bank default risk has been subject to large swings during the last two decades. As the sample period (2000-14) was characterised by highly differentiated macro-financial environments, the regression results shown in column (2) distinguish between a pre-crisis period (2000-2007) and a crisis/post-crisis period (2008-14). For the pre-crisis period, two notable differences relative to the base case specification should be highlighted. First, income diversification in this period tended to be

¹³² As regards variables not strictly related to business model characteristics, it is notable that stronger real GDP growth and lower short-term interest rates tend to be associated with lower bank default risk.

associated with higher default risk. With the emergence of the financial crisis, however, more diversified banks performed better and displayed lower default risk levels, as they were less dependent on single business lines. Second, the effect of higher cost efficiency on reducing risk was stronger prior to the crisis. Interestingly, in the crisis/post-crisis period, bank size in itself was no longer an important determinant of bank default risk, which could reflect that being a large bank was not necessarily an effective shield against default risk during the crisis.

These findings notwithstanding, specific business model characteristics might be more or less important depending on the size and complexity of the bank.

Thus, in column (3) of **Table C.1** a distinction is made between global systemically important financial institutions (G-SIBs) and smaller, less complex banks. While leverage contributes to bank default risk to a broadly similar degree, cost efficiency is a more important factor for G-SIBs than for other banks. This suggests that an inefficient business model can be more detrimental to larger and more complex banking groups. Furthermore, it is found that income diversification tends to lead to higher default risk for G-SIBs, while for other banks it tends to reduce overall riskiness. Again, this could indicate that diversification is beneficial up to a point, but for a certain level of banking group complexity, its effect on bank risk reverses. Lastly, a higher retail ratio reduces risk for G-SIBs, indicating that shifting to retail activity can have stability benefits for complex banking groups.

Future prospects: challenges and obstacles

Looking ahead, banks' business strategy (activity mix) and risk-taking will be shaped by their adaptation to a diverse set of external factors.

These challenges include new regulatory requirements, the low interest rate environment and strengthening competition from non-banks engaging in bank-like activities. In recent years, these diverse factors have made it difficult for banks to continue operating efficiently with their existing business models.

There is no "one-size-fits-all" strategy for business model adjustment. While some of the post-crisis trends in banks' business model structures have no doubt contributed to making banks safer and more stable (i.e. lower leverage, more stable funding, lower complexity), the results presented in this special feature highlight that, in the current context, there is not necessarily one specific business model that is distinctly superior to other models in terms of risk and performance. The preferred strategy will likely depend on the starting point of the individual bank and on its operating environment. Adjusting business models is a complicated and costly process, especially for more complex institutions, and each banking group will need to build on existing strengths and identify weaknesses that are likely to be exacerbated in the future unless concerted actions are taken to address them by bank management.

Accordingly, some banks will be incentivised to focus on the retail segment and fee-generating activities.

As reflected in the above-mentioned survey by the European Banking Authority, many banks plan to revitalise their retail banking

operations. Moreover, given the (cyclical) profitability challenges arising from the low interest rate environment, banks will be incentivised to diversify revenue sources, in particular by increasing the share of fee and commission income. An international comparison suggests that euro area banks have significant room to expand this type of income. However, such a shift is likely to be gradual and is also dependent on the rate of development of capital markets as well as on competition both within and from outside the banking sector (e.g. from fintech companies) which has the potential to limit the growth of fee income.¹³³

Another avenue to address profitability pressures is to further increase cost efficiency. This can be done in various ways, such as by changing operating models, improving multichannel distribution capacities (e.g. via higher reliance on digital platforms) and improving IT systems. Such measures may, however, entail additional costs in the short term, with efficiency gains likely to be realised only in the longer term.

Cyclical profitability challenges are in some cases exacerbated by structural factors, such as overcapacity in certain banking markets. Excess capacity and fragmentation along national lines are to some extent hampering the profitability and performance of some euro area banking sectors.¹³⁴ The banking union, including single supervision and resolution mechanisms, in principle provides ideal conditions for banks to capitalise on new cross-border merger and acquisition opportunities. However, progress in both domestic and, in particular, cross-border bank consolidation remains limited to date. In fact, EU banks' merger and acquisition activity has significantly slowed since 2007, in terms of both the number and the value of transactions.¹³⁵ More efforts could be initiated to foster further cross-border consolidation within the euro area. Ultimately, the euro area economy needs banks that are large and efficient enough to operate and diversify risks on a cross-border basis within a European single market, but small enough to be resolved with the resources of the Single Resolution Fund. This would help reap the full benefits of the banking union and improve the trade-off between financial stability and economic efficiency.¹³⁶

From a financial stability perspective, an important challenge is ensuring that the adaptation of banks' business models to the new operating environment is not accompanied by excessive risk-taking. Given the profitability challenges arising from the low nominal growth and low interest rate environment, banks might be tempted to take greater risks, for instance by increasing the share of riskier (lower-rated) exposures, taking on higher duration risk in their bond portfolios or

¹³³ For recent reviews of the challenge that fintech poses to traditional banking, see, for example, "Modular Financial Services: The New Shape of the Industry", Oliver Wyman, January 2016; "Digital Disruption: How FinTech is Forcing Banking to a Tipping Point", Citi GPS, March 2016; and "Technological Innovation and the Dutch Financial Sector: Opportunities and Risks for Financial Institutions, New Market Participants and Supervision", De Nederlandsche Bank, January 2016.

¹³⁴ In fact, there is some empirical evidence that euro area banks operating in less-concentrated markets tended to be less profitable in the period between 1991 and 2013 (see Kok, C., Mór, C. and Pancaro, C., op. cit.).

¹³⁵ See *Report on financial structures*, ECB, October 2015.

¹³⁶ See also the speech given by Benoît Cœuré entitled "From challenges to opportunities: rebooting the European financial sector" at Finance Day 2016, Frankfurt am Main, 2 March 2016.

loosening credit standards to increase volumes. This highlights the need for the close monitoring of interactions between business model changes, bank risk-taking and systemic risk.

Box 1

Global banks' legal costs: trends, drivers and implications¹³⁷

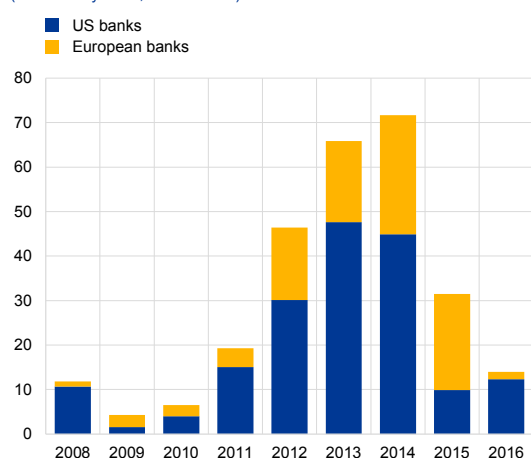
Banks across the globe have been confronted with rising legal risks since the onset of the global financial crisis. Despite the large number of concluded cases and court settlements to date, the running and expected costs of past misconduct remain substantial (not only in financial terms, but also reputationally), thereby weighing on bank profitability via both increased provisioning needs for expected costs as well as higher operating expenses in conjunction with the need to enhance internal controls and compliance, handle customer complaints and manage legal proceedings. In addition, legal costs may hurt bank capitalisation either directly through unexpected and/or under-provisioned charges, or indirectly via banks' impaired internal capital-generating capacity on the back of lower profits, while they may also hamper banks' intermediation capacity and impede the provision of new credit to the economy.

Chart A

Global banks' legal costs have increased markedly since 2008

Legal costs in the United States and Europe

(2008 – May 2016; USD billions)



Source: Authors' compilation based on publicly available information from regulatory, bank and law firm notices.

Legal costs have been material for the largest global banks, in particular for US institutions. A sample of 26 global banks¹³⁸

headquartered in the United States, the United Kingdom, Switzerland and the euro area suggests that cumulative legal costs (including damages, fines, settlements and litigation costs)¹³⁹ have reached almost USD 275 billion since 2008.¹⁴⁰ From a *backward-looking perspective*, aggregate developments to date suggest a strong pick-up in legal costs in the period 2009-14, with more than half of these costs (around USD 140 billion) incurred in 2013-14 (see **Chart A**). This development was predominantly attributable to US banks which were confronted with the legal costs earlier and in much larger volumes than their European

¹³⁷ Prepared by Sándor Gardó and Benjamin Klaus.

¹³⁸ The sample covers the 22 global systemically important banks (G-SIBs) and four non-G-SIBs. The US sample includes Bank of America, BNY Mellon, Citigroup, Goldman Sachs, JPMorgan, Morgan Stanley, State Street and Wells Fargo, while the European sample comprises two Swiss (Credit Suisse and UBS), five UK (Barclays, HSBC, Lloyds Banking Group, Royal Bank of Scotland and Standard Chartered) and eleven euro area (BNP Paribas, Commerzbank, Crédit Agricole, Deutsche Bank, ING, Intesa Sanpaolo, Groupe BPCE, Rabobank, Santander, Société Générale and UniCredit) banks.

¹³⁹ The analysis relies on data based on regulatory, bank and law firm notices, as well as data obtained from banks' annual reports. When comparing the findings from the two datasets, a potential overlap may arise as agreed and announced legal costs may not yet have been paid for, while they have already been recognised as provisions in banks' books.

¹⁴⁰ This estimate is, however, surrounded by a large degree of uncertainty and might be rather conservative given the lack of sufficiently granular, publicly accessible information as well as often undisclosed settlement agreements (e.g. in respect of civil claims).

counterparts. Hence, looking at legal costs by *bank origin*, US banks account for almost two-thirds of the total since 2008 (see **Chart B**). European banks recorded more legal costs than their US peers for the first time in 2015, albeit amid a marked drop in overall legal costs for global banks. Around 57.5% of the remaining USD 95 billion of legal costs for European banks is attributable to UK institutions, 27.5% to euro area banks and 15% to Swiss banks.

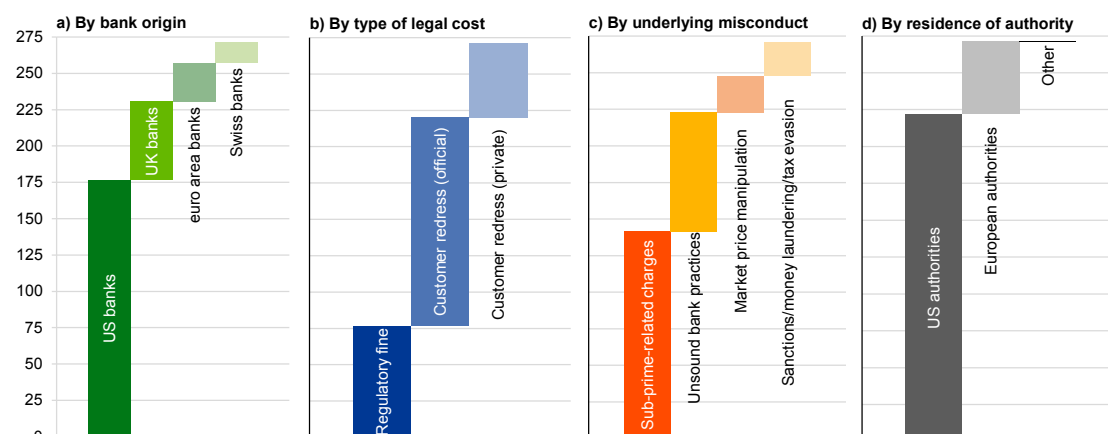
In terms of the type of legal costs, customer redress arrangements agreed with regulators and regulatory fines cover the bulk of legal costs. 53% of the total relates to the former, and 28% to the latter. 19% relates to settlements with private individuals and institutional counterparties, in particular in class action lawsuits (see **Chart B**). US banks have been more exposed to private settlements, while European banks have mostly faced regulatory fines.

Chart B

A large part of legal costs relates to settlements of US banks with US authorities in the form of customer redress for sub-prime-related misconduct

Legal costs of global banks by bank origin, type of legal cost, underlying misconduct and residence of the involved authority

(2008 – May 2016; USD billions)



Source: Authors' compilation based on publicly available information from regulatory, bank and law firm notices.

Notes: Regulatory fines comprise all penalties levied by national regulators on banks. Official customer redress comprises legal costs related to the compensation of customers ordered by public authorities. Private customer redress indicates bilateral and class action lawsuit settlements with private counterparties, i.e. individual/institutional investors. Sub-prime-related incidents cover legal costs related to the issuance, structuring, marketing and sale of residential mortgage-backed securities and collateralised debt obligations, as well as to the underwriting, origination and servicing of mortgage loans. Unsound bank practices include, inter alia, the mis-selling of payment protection insurance, disclosure, reporting and compliance failures, as well as investment advice failings. Market price manipulation includes legal costs for fraudulent behaviour in interest rate, foreign exchange, swap, gold and silver price fixing. The category sanctions/money laundering/tax evasion comprises legal costs related to the failure to comply with international sanctions, anti-money laundering failures and banks' involvement in or assistance of tax evasion.

As regards the underlying misconduct, US banks' legal costs are mainly sub-prime-related, while European banks mostly face legal costs for unsound bank practices and market manipulation. Sub-prime-related legal costs mainly penalise misconduct relating to the issuance, structuring, marketing and sale of residential mortgage-backed securities and the servicing of mortgage loans. Legal costs for unsound bank practices refer, in particular, to the mis-selling of payment protection insurance (PPI) in the United Kingdom, while market price manipulation costs mainly relate to LIBOR/EURIBOR fixing. Failure to comply with international sanctions and anti-money laundering requirements, and involvement in or assistance of tax evasion captures the remaining portion of legal costs, which is relevant in particular for euro area banks (see **Chart B**). Overall, the differences in the level of costs faced by banks can largely be explained by banks' differing involvement in various business activities (retail/universal banking vs.

wholesale/investment banking) as well as country specificities (e.g. the importance of sub-prime lending in the United States prior to the crisis).

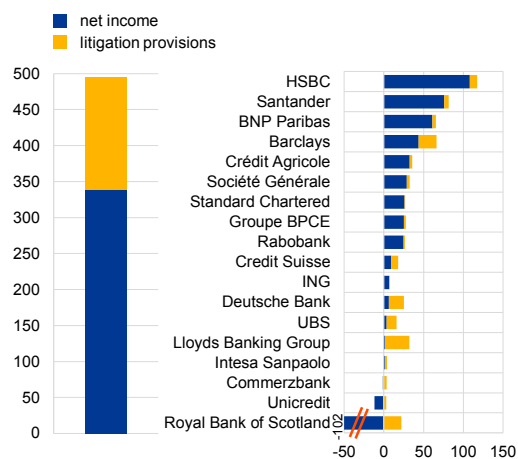
Concerning the residence of the authority involved, the majority of settlements was concluded with US authorities. Federal regulators, as well as various oversight bodies, states and courts in the United States have levied over 80% of the total costs (see **Chart B**). The rest is mostly attributable to UK authorities, in particular for costs relating to payment protection insurance.

Chart C

Heightened provisions for legal costs continue to weigh on bank profitability

European banks' net income and flow of provisions for legal costs

(2008-15; cumulative flows, USD billions)



Sources: SNL Financial and banks' annual reports.
Note: Net income after taxes, minority interests, and extraordinary and other after-tax items.

Legal costs had a substantial impact on European banks' profits. Since the onset of the global financial crisis, European banks have set aside USD 160 billion in provisions to cover expected legal costs. This amount represents almost half of European banks' net income earned between 2008 and 2015 (see **Chart C**). To put it differently, banks' net income could have been one-third higher over the same period were it not for these legal costs, which could have been used to strengthen capital buffers in the form of retained earnings. The stock of European banks' provisions for legal costs has tended to increase relative to banks' equity capital, reaching some 3.5% of their total equity as at year-end 2015. Heterogeneity across individual institutions is high though, with the stock of provisions for legal costs ranging from 0.5% to almost 12% of banks' equity capital.

Despite the large number of concluded cases and settlements to date, the expected costs of past misconduct remain substantial. More granular data on the stock of provisions for legal costs obtained from the annual reports of IFRS-reporting European banks provide a rough measure of expected future legal costs, though these estimates are surrounded by a large degree of uncertainty. The figures indicate that as at the end of 2015 European banks expected to face additional legal costs amounting to around USD 50 billion. Almost half of this amount has been put aside by UK institutions, in particular for settling costs arising out of PPI-related misconduct. The underlying trend in the stock of provisions suggests that the peak may not yet have been reached for many UK and euro area banks. This may suggest further pressures on banks' profitability and internal capital-accumulation capacity going forward.

Rising legal costs may foster banks' efforts to adjust their business models. The large number of legal cases still pending and uncertainties surrounding the magnitude and timing of forthcoming settlements may also lead to changes in banks' business models as banks downsize or fully withdraw from business lines which were at the heart of past misconduct and are currently the subject of regulatory scrutiny.¹⁴¹

¹⁴¹ For further details, see the [Report on misconduct risk in the banking sector](#), ESRB, June 2015.

Box 2

A statistical approach to classify euro area banks according to business model characteristics¹⁴²

This box presents a statistical approach to classify euro area significant institutions according to business model characteristics. There are various ways in which to identify business models and different classifications may serve different purposes, also at the ECB. The bank business model classification presented here should only be seen as an illustrative example of how European banks can be grouped according to selected characteristics and of how these groupings have changed over time. Importantly, it is not used for microprudential purposes by the ECB.

This multifaceted nature of banks' business models poses challenges for the classification of banks based on their business activities. Banks undertake a variety of activities, ranging from more traditional intermediation functions, such as granting loans and taking deposits, to more capital market-oriented functions such as market-making, trading and advisory services. This diversity is reflected in the heterogeneous balance sheet structures with which European banks operate, both in terms of asset decomposition and in terms of funding sources.

Banks' business models can be classified using different methods. One approach often applied is to group banks according to certain predefined criteria (e.g. a specific share of retail products on a bank's balance sheet).¹⁴³ Other, more data-driven approaches use statistical clustering techniques. It is important to emphasize that while classifying business models using purely statistical methods (as in this box) can be useful in providing an objective information set, one should be careful in drawing firm conclusions as results are highly contingent on the quality of the underlying data. Moreover, for practical (prudential) usage such business model classifications should also incorporate relevant qualitative information and expert judgement.

The clustering approach is a statistical method aimed at identifying the proximity of specific data points using a metric of distance. In other words, banks are grouped according to the similarities in the input data and, given that past strategic decisions by bank management are inevitably reflected in the structure of banks' assets and liabilities, the resulting clusters can be associated with different business models. The smaller the differences between the characteristics of banks' balance sheets, the higher the likelihood that the banks will be classified into the same cluster. More specifically, the approach uses average and least square differences between the banks' characteristics variables. Drawing upon existing studies¹⁴⁴, business models were investigated using six variables: risk-weighted assets (or size), net fee and commission income as a share of operating income, customer funding as a share of total liabilities, interbank funding as a share of total liabilities, trading assets as a share of total assets and domestic exposure as a share

¹⁴² Prepared by Fabio Franch and Dawid Żochowski.

¹⁴³ See, for instance, Ayadi, R. and de Groen, W. P., op. cit.

¹⁴⁴ See, for example, Ayadi, R., Arbak, E. and de Groen, W. P., "Business Models in European Banking: A pre-and post-crisis screening", Centre for European Policy Studies (CEPS), Brussels, 2011; Altunbas, Y., Manganelli, S. and Marques Ibañez, D., op. cit.; Ferstl, R. and Seres, D., "Clustering Austrian Banks' Business Models and Peer Groups in the European Banking Sector", *Financial Stability Report*, 24, Oesterreichische Nationalbank, 2012, pp. 79-95; and Lucas, A., Schaumburg, J. and Schwaab, B., "Bank business models at zero interest rates", mimeo, April 2016.

of total assets. The analysis covers 113 significant institutions that are supervised by the ECB, using data for 2007 and 2014.¹⁴⁵

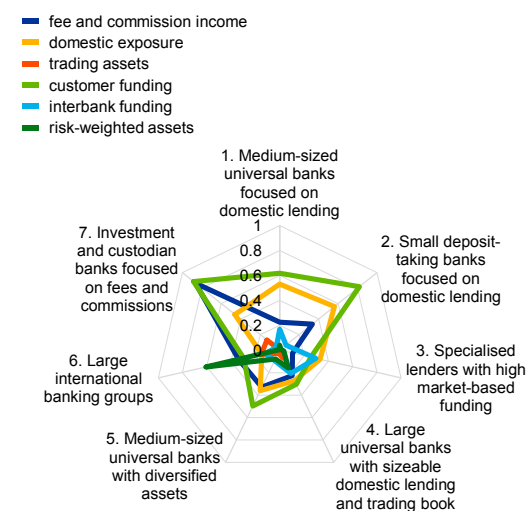
The clustering analysis suggests that key determinants for the grouping of banks into different business models primarily relate to bank size, non-domestic exposures and funding profiles (see **Chart A**). Looking at the balance sheet characteristics of clusters of banks in 2014, the following business models can be identified: (1) medium-sized universal banks focused on domestic lending; (2) small deposit-takers focused on domestic lending; (3) local or specialised lenders with a significant share of market funding; (4) large universal banks funded by deposits with sizeable domestic exposure as well as sizeable trading assets; (5) medium-sized universal banks with diversified assets largely relying on deposit funding; (6) large international banking groups with internationally diversified assets, a substantial share of market funding and sizeable trading assets; and (7) investment and custodian banks focused on fee and commission income.

Chart A

Business model classification driven by size, internationalisation and funding profile

Balance sheet structure of different business models

(2014; ratios and percentage shares)



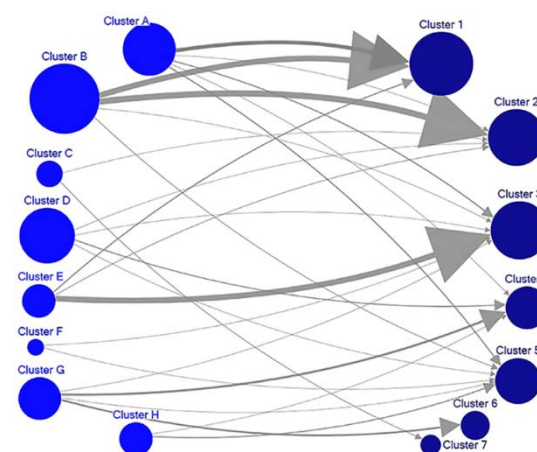
Sources: Bankscope, Bloomberg, SNL Financial and ECB calculations.
Note: The chart shows the median of variables used for the identification of clusters for each of the seven clusters identified for the year 2014.

Chart B

Banks have mostly remained within the same business model clusters over time

Evolution of business model clusters between 2007 and 2014

(left-hand side: 2007; right-hand side: 2014; percentage of total equity)



Sources: Bankscope, Bloomberg, SNL Financial and ECB calculations.
Notes: The bubble size represents the number of banks in the bank cluster. The thickness of the arrows represents the number of banks that remain in the same cluster or move across clusters.

According to the chosen clustering approach, eight business model clusters are identified for 2007 and seven clusters are identified for 2014. Moreover, the classification to clusters seems to be relatively stable over time (see **Chart B**). While some banks migrated across clusters between 2007 and 2014, most of them remained in the same group. This shows that banking business models tend to be relatively “sticky” and cannot be seamlessly adapted to a changing environment or in anticipation of stress. This may have particular implications for financial

¹⁴⁵ Data from Bankscope, Bloomberg and SNL Financial were used to produce a more consistent and complete picture of euro area banks' balance sheet in the pre- and post-crisis era.

stability, since some groups of banks may be more prone to systemic stress than others. This, in turn, could lead to a concentration of systemic risk in some clusters of banks.

Abbreviations

Countries

AT	Austria	IT	Italy
BE	Belgium	JP	Japan
BG	Bulgaria	LT	Lithuania
CH	Switzerland	LU	Luxembourg
CY	Cyprus	LV	Latvia
CZ	Czech Republic	MT	Malta
DK	Denmark	NL	Netherlands
DE	Germany	PL	Poland
EE	Estonia	PT	Portugal
IE	Ireland	RO	Romania
ES	Spain	SE	Sweden
FI	Finland	SI	Slovenia
FR	France	SK	Slovakia
GR	Greece	UK	United Kingdom
HR	Croatia	US	United States
HU	Hungary		

Others

ABCP	asset-backed commercial paper	EFSM	European Financial Stabilisation Mechanism
ABS	asset-backed security	EIOPA	European Insurance and Occupational Pensions Authority
ARM	adjustable rate mortgage	EMEs	emerging market economies
AuM	assets under management	EMIR	European Market Infrastructure Regulation
BCBS	Basel Committee on Banking Supervision	EMU	Economic and Monetary Union
BIS	Bank for International Settlements	EONIA	euro overnight index average
BLS	bank lending survey	EPS	earnings per share
BRRD	Bank Recovery and Resolution Directive	ESA 2010	European System of Accounts 2010
CAPM	capital asset pricing model	ESAs	European Supervisory Authorities
CBPP	covered bond purchase programme	ESFS	European System of Financial Supervision
CCP	central counterparty	ESM	European Stability Mechanism
CDO	collateralised debt obligation	ESMA	European Securities and Markets Authority
CDS	credit default swap	ESRB	European Systemic Risk Board
CET1	common equity Tier 1	ETF	exchange-traded fund
CISS	composite indicator of systemic stress	EU	European Union
CLO	collateralised loan obligation	EUR	euro
CMBS	commercial mortgage-backed security	EURIBOR	euro interbank offered rate
CPI	Consumer Price Index	FiCoD	Financial Conglomerates Directive
CRD	Capital Requirements Directive	FMI	financial market infrastructures
CRR	Capital Requirements Regulation	FSI	financial stress index
CSD	central securities depository	FSR	Financial Stability Review
CT1	core Tier 1	FVA	fair value accounting
DGS	deposit guarantee scheme	FX	foreign exchange
DSGE	dynamic stochastic general equilibrium (model)	G-SIB	global systemically important bank
EA	euro area	G-SII	global systemically important institution/insurer
EBA	European Banking Authority	HICP	Harmonised Index of Consumer Prices
EDF	expected default frequency	ICPFs	insurance corporations and pension funds
EEA	European Economic Area	IFRS	International Financial Reporting Standards
EFSF	European Financial Stability Facility		

IMF	International Monetary Fund	OMTs	Outright Monetary Transactions
JPY	Japanese yen	O-SIIs	other systemically important institutions
LBO	leveraged buyout	OTC	over-the-counter
LCBG	large and complex banking group	P/E	price/earnings (ratio)
LCR	liquidity coverage ratio	PD	probability of default
LGD	loss given default	RMBS	residential mortgage-backed security
LTD	loan-to-deposit (ratio)	ROA	return on assets
LTI	loan-to-income (ratio)	ROE	return on equity
LTV	loan-to-value (ratio)	RWA	risk-weighted assets
MBS	mortgage-backed security	SBG	significant banking group
MFI	monetary financial institution	SIFI	systemically important financial institution
MMF	money market fund	SIPS	systemically important payment system
MReit	mortgage real estate investment trust	SIV	structured investment vehicle
MRO	main refinancing operation	SMEs	small and medium-sized enterprises
NAV	net asset value	SMP	Securities Markets Programme
NFC	non-financial corporation	SPV	special-purpose vehicle
NiGEM	National institute Global Economic Model	SRM	Single Resolution Mechanism
NPE	non-performing exposure	SSM	Single Supervisory Mechanism
NPL	non-performing loan	SWF	sovereign wealth fund
OECD	Organisation for Economic Co-operation and Development	TLTRO	targeted longer-term refinancing operation
OFIs	other financial intermediaries	USD	US dollar
OIS	overnight index swap	VaR	value at risk

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Postal address 60640 Frankfurt am Main, Germany
 Telephone +49 69 1344 0
 Website www.ecb.europa.eu

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