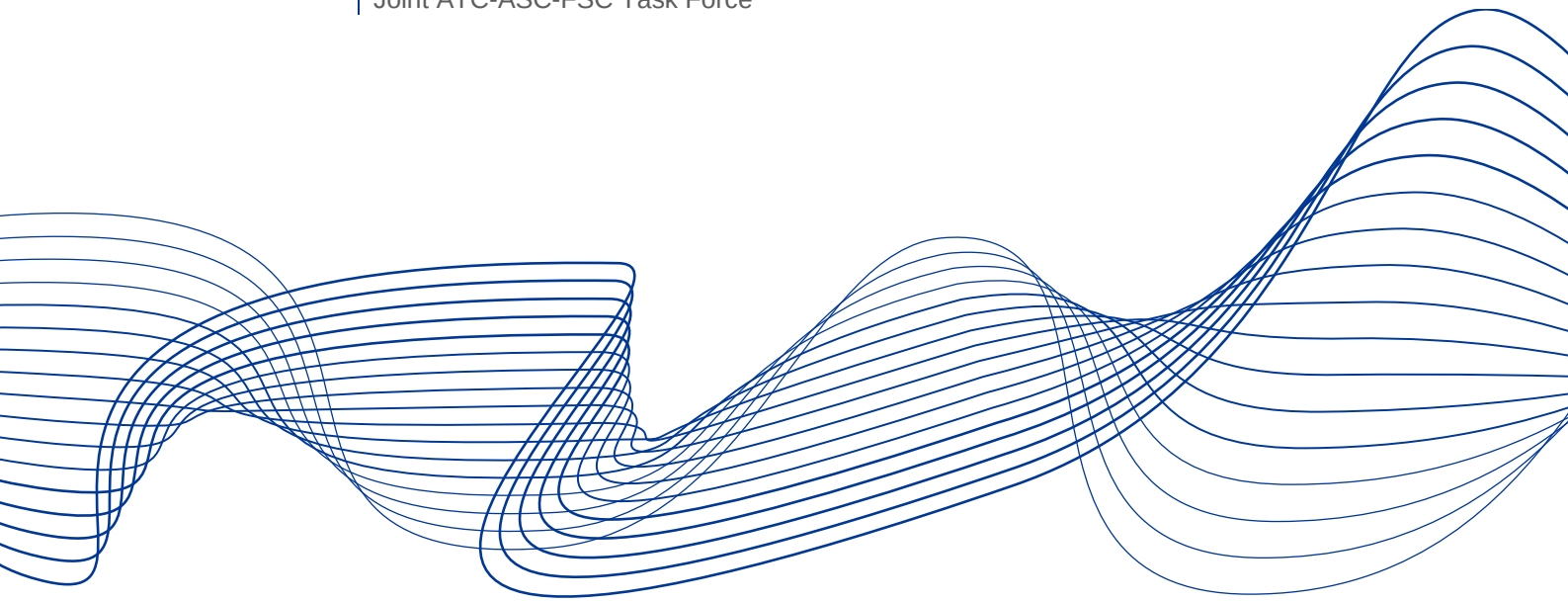
Technical documentation
Section E

November 2016

The impact of low interest rates and ongoing structural changes from horizontal, cross-country and EU-wide perspectives

Joint ATC-ASC-FSC Task Force



ESRB
European Systemic Risk Board
European System of Financial Supervision

Contents

Executive Summary

Interest rate trends, particularly when they interact with structural vulnerabilities, may have significant systemic consequences for financial stability. The “low for long” scenario poses significant challenges because, in the long run, it is likely to challenge the profitability of most types of financial institutions, giving rise to a search for yield. Adverse financial stability consequences may also arise from an unexpected increase in interest rates after a long period of low interest rates. It is not possible to hedge against the structural changes that produce a scenario of a prolonged period of low interest rates but there are inherent risks that have to be borne. In some instances it may be optimal from a financial stability perspective to shift risks to non-financial agents (firms and households) or to the government. In contrast, a shift of risk to less-regulated agents (regulatory arbitrage) may raise risk even further.

In the EU, firms and households are financed predominantly through banks which, as a consequence, play an important role in the transmission of risks emerging in the low interest rate environment. Life insurance companies play an important role in retirement saving in many countries, and both types of institutions have come under pressure as their profitability has been squeezed in the low interest rate environment. Reduced profit margins are incentives to increase risk-taking in large parts of the financial system, affecting the pricing of risk in the economy. At the same time, the role of the shadow banking sector has increased over time, although with significant heterogeneities across EU countries. This trend could be amplified in the “low for long” scenario. For example, there is likely to be a growing reallocation of activities to less-regulated sectors in a search for yield, which potentially raises financial stability risks. As a consequence of the shift towards market-based financing, market liquidity risks may become more significant as more financing activities are conducted through markets, reducing the diversity of the financial system. Contagion effects through fire sales may therefore increase in importance. Although developments in the regulatory environment in recent years have enhanced the resilience of the EU financial system overall, some features may, in certain sectors, also increase the vulnerabilities associated with a low interest rate environment.

An overall assessment of the impact of the low interest rate environment on the financial system should take a system-wide perspective, taking into account the optimal allocation of interest rate risk and the effects on the wider economy and household wealth. In an environment of prolonged low interest rates, business models specialising in the longer-term allocation of savings are the most vulnerable.

Of the key risks to EU financial stability identified by the ESRB Member Institutions in mid-2015, several are related to the low interest rate environment and, in the case of a “low for long” scenario, are likely to increase further. Channels for cross-sectoral risk spillovers include direct linkages among sectors as well as further links such as institutional set-up (conglomerates) or links via exposures to correlated assets (financial markets). A wider implication is the transfer of risks related to longer-term returns on assets from the intermediating financial sector to households. Within the household sector, net borrowers benefit from low interest rates while net savers lose, also bearing increasing credit risk due to (i) a lack of incentives to deleverage, and (ii) a lack of compensation for the increasing credit risk held by net savers. If the potential risks described in this report were to materialise, for example, in the life insurance or pension fund sectors, the related costs could be transferred to the younger generation.

Any intervention by the financial stability authorities to prevent the build-up of risks in the low interest rate environment should take a holistic and system-wide perspective, taking spillovers between different sectors into account as well as common vulnerabilities due to correlated

exposures. Cooperation between microprudential and macroprudential supervisors is crucial in order to identify and assess risks to financial stability. It should also be ensured that the appropriate micro- and macroprudential policy tools are available to tackle risks in the financial system, including those in the non-banking sectors.

Section 1
Allocation of interest rate risk in the economy

Key take-aways: *Interest rate trends, particularly when they interact with structural vulnerabilities, may have significant systemic consequences for financial stability. The "low for long" scenario may pose significant challenges because, in the long run, the profitability of most types of financial institutions is likely to come under pressure, possibly leading to weaker resilience and, if risks materialise, disorderly restructuring. Hedging against this scenario may not be possible within the financial sector. Adverse consequences for financial stability may also result from an unexpected increase in interest rates after a long period of low interest rates. In some instances, it may be optimal from a financial stability perspective to shift risk to non-financial agents (firms and households) or to the government. In contrast, a shift of risk to less-regulated agents (regulatory arbitrage) could raise risk even further. Consequently, any interventions by the financial stability authorities to prevent the build-up of risks in the low interest rate environment should take a holistic and system-wide perspective, taking into account the allocation of interest rate risk and the effects on the wider economy.*

Policy prescriptions that respond to the low interest rate environment require an understanding of the nature of trends in observed interest rates. In general terms, interest rates reflect structural factors in the economy. Uncertainties regarding these factors, e. g. technological developments or preferences, translate into uncertainties regarding future interest rates, leading, among other things, to valuation and refinancing risks. The "low for long" scenario reflects fundamental structural changes in the economy that could not have been predicted several years ago, and implies that the investment policies of financial institutions, firms and households may need to adjust to the new environment. At the same time, uncertainty remains as to whether interest rates will stay "low for long" or whether they will return "back to normal" within several years. Another possibility is an event involving a sudden or faster than expected rise in interest rates. Under these scenarios, as well as taking into account the related uncertainty over future developments, an accumulation of risks may call for policy actions.

Interest rate risk has to be borne by someone and cannot be "diversified away", although it can be allocated in a number of ways in the economy. Differences in agents' balance sheet structures and specific features of financial contracts may partly smooth risks arising from interest rate volatility.[1] For example, temporary decreases or increases in interest rates affect banks and insurance companies in opposite ways due to their opposite maturity structures. Interest rate risks may therefore be kept on financial institutions' balance sheets provided they are backed by sufficient regulatory capital to ensure that the system remains resilient. Certain specific risks (e.g. those related to medium-term trends in interest rates) can also be re-allocated within the financial sector, depending on the market structure (e.g. to pension funds, insurance companies or shadow banks). Due to the heterogeneity of balance sheet structures (e.g. duration of assets/liabilities) such shifts may be beneficial from a financial stability and risk-sharing perspective, in particular under the "back to normal" scenario, where rates increase gradually. At the same time, a reallocation of risks to less-regulated agents (regulatory arbitrage) could pose challenges to financial stability. In some

[1] Contract features relevant for the ability to hedge interest rate risks include the degree of maturity transformation, duration mismatch, the prevalence of hedging contracts, contractual features such as variable versus fixed loan rates, guaranteed rates in life insurance contracts, defined contribution versus defined benefit in pension plans, redemption rules, diversification of business activities, also internationally, as well as accounting procedures. Financial and technological innovations play an important role here.

instances, it may be optimal from a financial stability perspective to shift risks to non-financial agents (firms and households) or to the government.[2] Finally, the rest of the world can absorb part of the risk when global interest rate correlations are sufficiently low.

It may not be possible to hedge against the structural changes that produce a scenario of prolonged low interest rates, which could pose challenges for financial stability. The "low for long" scenario creates significant challenges for financial stability because, in the long run, the profitability of most types of financial institutions is likely to come under pressure. In particular, banks would suffer from a flattening of the yield curve, with their net interest margins and hence their profits from maturity transformation reducing, while guaranteed-rate life insurers and defined-benefit pension funds would find it difficult to meet contractual obligations. Additionally, if profitability is in secular decline, the sector could restructure, but if this is done in a disorderly fashion the transition to a new equilibrium might generate instability. Second-round effects may further weaken the system via spillover mechanisms. Risks to financial stability may be additionally increased by excessive risk-taking in the financial system in response to the erosion of profits, until expectations have adjusted to the new normal. Overall, ultimate hedging against the "low for long" scenario may not be possible via financial contracts because the risk to be hedged against would simply reappear in the form of counterparty risk.[3]

Potential risks to financial stability could also derive from an increase in interest rates after a long period of low levels. In particular, the effect could be damaging for banks with fixed-rate loans, especially when they have already adjusted their lending rates to the low interest rate environment. Also, risks could arise through a substantial re-pricing of assets (e.g. stocks and real estate).

Apart from the vulnerabilities, which may build up under either the "low for long" or "back to normal" scenarios, uncertainty over the state of the economy and the resulting risk that expectations and risk premia will be reassessed is identified as one of the key risks to EU financial stability. The key aspect of the current environment of low interest rates is uncertainty over the long-term level of interest rates, corresponding to the potential growth and the long-term level of returns for a broad range of asset classes. As reflected in current market pricing (e.g. by the forward curves of overnight rates), there is a high degree of uncertainty as to whether the economy is in a "low for long" or "back to normal" scenario. Market participants are uncertain of the nature of the causes underlying the currently observed low interest rate environment, in particular with respect to the role of longer-term structural factors. This uncertainty could lead to potential misallocations of capital and resources in the financial system. For example, economic agents could adjust their behaviour, expecting a recovery in interest rates and growth, and yet be surprised later by low growth materialising over time. These effects add to the vulnerabilities generated in the low interest rate environment, and could result in a period of misallocation of capital and lead to reallocations once the probability of the scenarios has been reassessed by economic agents. Moreover, the uncertainty may also give rise to an endogenously protracted low interest rate environment. If non-financial corporations withhold investment for fear of low demand and households save as a precautionary measure, additional downward pressure on interest rates is applied endogenously, prolonging the low interest rate environment.

Any interventions by the financial stability authorities to prevent the build-up of risks in the low interest rate environment should take a holistic and system-wide perspective, taking into account the allocation of interest rate risk and the impact on the broader economy. The role of regulation, as well as that of risk management, in the low interest rate environment is

---

2 See also Hellwig (1995).

3 For example, shifting risks to borrowers through variable-rate contracts may not be fully effective, as interest rate risk will be correlated with credit risk. Also, hedging via financial markets may become challenging, as indicated by the evidence of rising correlations across different asset classes during certain periods in the past years (see MPAG (2015).

increasingly relevant when parts of the financial sector cannot absorb the risks they are exposed to. Only by taking a holistic perspective can the resulting priorities for regulation and supervision address the complete financial system and mitigate regulatory arbitrage. Risk assessments and the resulting regulatory and/or supervisory approaches should take into account the allocation of interest rate risk across the different sectors of the economy. Finally, the effects on the broader economy should be considered. Cooperation between microprudential and macroprudential supervisors is crucial in order to identify and assess risks to financial stability, as well as to ensure that the appropriate micro- and macroprudential policy tools are available to tackle the risks in the financial system in both the banking and the non-banking sectors.

Section 2
The interaction of structural changes in the financial system and the low interest rate environment

Key take-aways: *The EU financial system is dominated by banks which, as a consequence, play an important role in the transmission of risks emerging in the low interest rate environment. At the same time, the role of the shadow banking sector has increased over time, with significant heterogeneities across EU countries. This trend may be amplified in an environment of prolonged low interest rates. In particular, as a long-lasting low interest rate environment puts increasing pressure on the profitability of financial institutions (e.g. banks, guaranteed-return life insurers), an increasing reallocation of activities to the less-regulated sectors in search of yield becomes likely, increasing financial stability risks. Although developments in the regulatory environment in recent years have increased the resilience of the EU financial system overall, some features may also increase vulnerabilities in certain sectors due to the environment of low interest rates.*

2.1 Most important characteristics of the EU financial sector in the low interest rate environment

The EU financial system is dominated by banks which, as a consequence, play an important role in the transmission of risks emerging in the low interest rate environment. By way of international comparison, the European economy is strongly based on bank funding (see Charts A.1-A.2 in the Annex).[4] Assets of monetary financial institutions excluding central banks constitute slightly more than half of all assets in the financial system in Europe. This financial structure implies that the banking sector plays an important role in the transmission of risks emerging in the low interest rate environment over a long period of time.

Cross-country heterogeneity in the structure of financial systems may result in a clustering of risks related to the low interest rate environment, requiring a differentiated policy response. EU countries are heterogeneous in terms of the size and structure of their financial systems (see Charts A.3-A.4 in the Annex). Countries are very heterogeneous in terms of focus of banking activities on loan intermediation, ranging from systems where banks are mainly involved in other activities (Luxemburg, Ireland, the UK) to those with largely traditional lending-oriented business models (new Member States). As a consequence, under a scenario of a sudden reassessment of risk premia, countries with the largest financial sectors and the strongest links to financial markets will be most affected. Meanwhile, the profitability of the traditional lending-oriented banking sectors will be most adversely affected under a scenario of prolonged low interest rates.

The importance of banks in the EU financial sector is declining while that of other financial institutions is growing, and market-based funding is becoming more relevant. This trend could strengthen in the environment of prolonged low interest rates. The importance of banks in the EU has been falling gradually in recent years, while the role of the non-banking financial sector has been growing (see Charts A.5-A.6). These developments are related to the rise of new forms of market-based financing (e. g. securitisation), the more demanding regulatory environment introduced in response to the financial crisis, as well as subdued demand for loans for consumption and investment purposes, all amid the prevailing uncertainties related to the growth outlook.[5]

[4] See, e. g., Wolff/Veron (2015), ESRB (2014), and Langfield/Pagano (2014).
[5] ECB (2015): The euro area bank lending survey, second quarter of 2015 (July 2015).

Overall, financial activity has been relocating to market-based investments and funding (see Charts A.7-A.10). In particular, the share of debt securities and listed shares outstanding in total liabilities in the economy has increased in the EU, although the heterogeneity among countries is still significant.[6] Moreover, consumers and corporates have a growing number of ways to raise capital via web-based platforms.[7] In the household sector, while there is significant heterogeneity of accumulated savings across EU countries, the allocation of assets to insurance corporations, pension funds, and investment funds is increasing in many countries (see Charts A.11-A.12). Looking ahead, the trend towards market-based and direct funding is expected to continue, not least in the light of policy initiatives such as the Capital Markets Union. This trend could be further strengthened in a prolonged low interest rate environment.

Generally, a prolonged low interest rate environment puts the profitability of financial institutions under increasing pressure, which can further stimulate search for yield, changes to business models, and financial innovation. European financial institutions are operating in a constantly changing environment, forcing banks, insurers, asset managers, funds and other institutions to adapt to new circumstances. Many new developments, including digitalisation, new technologies, globalisation, demographic shifts, changing consumer behaviour and regulatory reforms have brought about structural changes to the financial system. In the environment of prolonged low interest rates, where profit margins on traditional banking activities have been cut, search for yield could be further encouraged, at least until expectations of returns have fully adapted to the new environment.[8] This could take the form of excessive risk-taking in traditional banking activities, e.g. debt portfolios concentrated on mortgages, lending to borrowers with low levels of competitiveness, or extended maturity and liquidity transformation. Search for yield could also take the form of accelerated technological and financial innovation. This, in turn, could cause financial stability risks to increase due, for example, to increasing search for yield in less regulated sectors or rising exposures to cyber risks. Finally, financial institutions are also adapting their business models in order to increase revenues (e.g. new business lines, and cooperation with shadow banking entities and new technology firms).[9] At the same time, some banks are returning to leaner business models to maintain profitability, by offering specialised services to serve a selected customer base more effectively.

The market entry of new financial technology firms ("Fintechs") has brought benefits for financial institutions, although it has created additional competitive pressures. Although the European alternative finance market is relatively small, it is growing strongly. The market entry of new firms is being fostered by the growing penetration of internet technologies, falling transaction costs and low hardware costs, which enable Fintechs to operate with a relatively low cost base in selected lucrative and minimally regulated business areas, creating a competitive advantage. In particular, the financial sector is attractive for Fintechs as many financial services are digitalised and can be automated without the need for a physical product (see Chart A.14 in the Annex for an overview of Fintechs' financial services products). While most Fintechs operate in the banking

---

6 Non-financial corporate sector started also to rely more on internal funds (an increase of equity is observed) and slightly more on other funding sources like debt securities and accounts payable (most probably to other non-financial corporations). The share of non-financial corporate sector's equity in total financial liabilities constituted slightly more than 50% in 2013. Nearly 70% of non-financial sector equity is unlisted shares, thus companies became less depended on market funding and possible fluctuations there. In addition, non-financial corporate sector has issued more debt securities than previously, benefitting from the increased demand for corporate debt securities in the low interest rate environment and search for yield behaviour of investors.

7 Crowdfunding, peer-to-peer (P2P) lending, P2P equity lending or bond issuances allow small businesses and individual to obtain funding directly from private investors, while web-platforms usually collect fees. Platforms include, for instance, Crowdcube (UK), Funding circle (UK), Ulule (FR), Mymicroinvest (BE) and Companisto (DE). These initiatives benefit especially start-ups who find it difficult to obtain initial capital. Some organisations also broker finance between institutional lenders and SMEs through online exchanges, or provide supplier finance, online factoring and invoice discounting.

8 In particular, generating traditional interest income and fee-based income is difficult, while many investment products are generating low yields. At the same time, legacy assets and systems, existing branch networks and new regulation (Basel III, Solvency II and regulation for OTC derivatives) are generating costs, and thus highlighting the need for cost efficiency.

9 For example, insurance corporations have started to offer both asset management and banking services.

sector, capital markets (platforms for portfolio management and algorithmic trading) and the asset management business, there are some service providers in the insurance sector. In the prolonged low interest rate environment they have managed to obtain capital from investors looking for higher returns. Overall, new financial technology firms are likely to expand, benefitting from cheap funding sources in the low interest rate environment and putting the profitability of traditional service providers under further pressure.

Looking ahead, in an environment of increasing competition and low interest rates, low profit margins on traditional activities and search for yield, business models are evolving towards less-regulated activities, creating potential risks to financial stability. In the environment of increasing competition and low interest rates, traditional financial institutions are reassessing their business lines and streamlining their activities. For example, according to PricewaterhouseCoopers (2015) estimates, banks were expected to sell around EUR 100 billion of their loan portfolios to funds and other institutions in 2015. At the same time, financial institutions may try to enhance profitability by partnering with non-banks and by developing new products. These trends, while beneficial from a cost efficiency perspective, may involve financial stability risks, for example by enhancing search-for-yield behaviour in the prolonged low interest rate environment. At the same time, should interest rates eventually rise, financial market shocks could be magnified by the leveraged and crowded positions of banks, investment funds and algorithmic traders.

2.2 Regulatory changes and the low interest rate environment

Significant improvements have been made since the beginning of the financial crisis to the regulatory agenda for different segments of the financial sector, in particular in respect of banks' capital and liquidity requirements, as well as bank resolution. An overview of regulatory initiatives undertaken in recent years shows that the reform agenda in the banking sector is currently at a fairly advanced stage. The Basel III framework has introduced stricter capital requirements, well above the levels in place before the financial crisis. Furthermore, the most systemically important institutions will be required to hold additional capital buffers. Banks should therefore be more resilient to shocks and their incentives to take excessive risks should be lower. In addition, the introduction of the leverage ratio will allow supervisory authorities to prevent banks from taking on excessive leverage. Basel III has introduced the new liquidity coverage and net stable funding ratios in order to enhance bank resilience against liquidity shocks. Significant progress has also been made in bank resolution. In particular, in the context of newly introduced resolution regimes such as the Single Resolution Mechanism in the euro area, progress has been made regarding creditor participation in bank restructuring through bail-ins. Specifically, the TLAC initiative, which targets global systemic banks, should ensure that these large and complex institutions have sufficient loss-absorbing capacity for their orderly resolution. Importantly, these efforts are not limited to global systemic banks: an analogous crisis management buffer (the minimum requirement for own funds and eligible liabilities, or MREL) is being launched at EU level to ensure that all banks are resolvable without causing financial instability and without requiring any public money.

The current regulatory approach may generate some challenges in the context of the low interest rate environment, although the overall impact of the ambitious reform agenda will be a more resilient banking sector. Regulatory changes may create a number of challenges in the environment of low interest rates. For example, the effects of banking regulation on market liquidity could amplify price reactions to changing interest rates.[10] Similarly, the introduction of

[10] The regulation of interest rate risk in the banking book is still under Pillar II and, therefore, subject to supervisory discretion.

TLAC and MREL might reinforce interconnectedness and foster the transmission of risks materialising in the low interest rate environment, for example via a link between banks and other financial institutions holding securities subject to the TLAC and MREL regulations (including contingent convertibles, i.e. CoCos). However, the net overall result of the current regulatory approach should be a banking sector that is much more resilient and better equipped to withstand potential threats, including those related to the low interest rate environment.

Insurance regulation has also undergone significant reform, evolving towards the use of more market-based valuation rules, incentivising a move to more resilient business models, not least because of the low interest rate environment. A more market-based valuation and capital requirement, as introduced by Solvency II, will allow interest rate risks to be captured more effectively during an assessment of insurance companies' resilience.[11] Under the scenario of prolonged low interest rates, the need to adjust certain business models that are not suited to this environment (like guaranteed-rate life insurance) becomes more acute, as the market-based value of liabilities increases significantly. This is, in principle, reflected in Solvency II capital requirements, although during transition to the new regime measures may be used to mitigate the negative impact of market-based valuation. However, since companies are obliged to report these measures publically their impact can be assessed by all market participants.[12] Therefore, this impact should be clearly understood by supervisors, especially in the context of uncertainty related to the nature of the currently observed low interest rates.[13] In particular, supervisors could impose a capital add-on on undertakings with a particularly high risk profile.[14] Overall, the implementation of Solvency II will incentivise insurance companies to be more risk sensitive and avoid duration gaps, which are "expensive" in terms of regulatory requirements. Due to pressure on their balance sheets, the current low yield environment may accelerate these changes.

The calibration of Solvency II discount curves is essential to avoid the risk of intergenerational wealth transfer in the prolonged low interest rate scenario. While Solvency

11 The Solvency II regulatory framework is built on the valuation of assets and liabilities at fair value. The interest rate level therefore has a direct impact on both parts of the prudential balance sheet: (i) The calculation of technical provisions through the risk-free rate curve. The design of the discount curve can heavily impact the ultimate result. Solvency II is built on two strong assumptions: the LLP (last liquid point) of the curve is at 20 years and the UFR (ultimate forward rate) to which the interest rates should converge in the 40 years after the LLP was estimated at 4.2%. In the current observed low interest rate environment, the relevance of this level of UFR (resulting from the sum of the 2.2% expected real rate and an expected inflation of 2%) is sometimes challenged. As it is expected to be stable over time and only to change due to changes in long-term expectations, a sound methodology to derive the UFR on an ongoing basis needs to be developed. (ii) The level of the SCR (solvency capital requirement) which is broken down into different modules representing the specific risks faced by insurers. As such, the SCR Market needs to be analysed: (i) The SCR calculation captures the sensitivity of the values of assets, liabilities and financial instruments to changes in the term structure of interest rates, or in the volatility of interest rates. This calculation includes the evaluation of the loss absorbency capacity of the technical provision (LAC TP); (ii) The counterparty default risk module reflects possible losses due to unexpected default, or deterioration in the credit standing of the counterparties and debtors of insurance and reinsurance undertakings over the following 12 months.

12 Fair value accounting might increase the volatility of insurers' own funds, especially in response to changes in spreads of assets provided that those changes do not pose a risk in the insurer's balance sheet. Hence, the Solvency II regime contains several elements which try to address this issue to reduce pro-cyclicality caused by spurious volatility which cannot be otherwise hedged. In particular, Omnibus II introduced in 2013 a set of measures called a long-term guarantee package aiming at smoothing the volatility through adjustments in the calculation of technical provisions (volatility adjustment, matching adjustment) or at smoothing the passage from Solvency I to Solvency II by introducing transitional periods. The transitional measures can only be used when they have been approved by national regulators who can reject their use as well as limit their scope.

13 See also ESRB (2015a and 2015b): Issues note May-2015 ATC and Aug-2015 ATC. As such, supervisors will be able to make full use of the Pillar II and III requirements in Solvency II which will allow them to better assess individual insurance undertakings and groups in this particular environment: (i) Reporting requirements oblige insurers to report to supervisors and disclose the most important information: the balance sheet, the SCR and the impact on these of the use of LTG and transitional measures. The first disclosure will be in 2017 (based on 2016 data) and will significantly increase transparency. (ii) Each undertaking is also required to send to the supervisor its ORSA (Own Risk and Solvency Assessment). It can be expected in the current low yield environment that undertakings will assess one or several scenarios linked with this environment. Once this strategic document has been approved by the AMSB (administrative management supervisory body), decisions stemming from the prospective analysis conducted will be taken.

14 While the current, non-harmonised, regulation of Solvency I does not address the interest rate issue specifically, some regulators have already introduced specific rules to limit the impact of the low interest rate environment on life insurers. As such, the rules do not really allow the capturing of the underlying risk for the insurance undertakings on both the assets and the liabilities side in all jurisdictions. However, when needed in some specific markets, regulators have already introduced specific rules to limit the impact of the low interest rate environment on life insurers: For example, the minimum level of interest-guaranteed rates was decreased in many countries, while an additional interest rate reserve (Zinszusatzreserve requirements – ZZR) was introduced in Germany. Such rules could still apply when Solvency II is implemented.

II discount curves are a significant step towards more market-based valuation rules, the calibration of the ultimate forward rate (UFR) is essential for a correct estimation of the value of liabilities in the case of the “low for long” scenario. If the discount curve is calibrated significantly above market rates the present value of the guaranteed benefits is significantly underestimated and appears to be covered by the accumulated contributions of policyholders. In such a situation, retirees benefit at the expense of younger policyholders, implying that the intergenerational subsidisation risk would materialise.

Solvency II may incentivise insurance companies to shift exposures from corporate to sovereign debt, which would decrease the risk of excessive search for yield, although it could promote other vulnerabilities related to the low interest rate environment. The spread risk module in Solvency II differentiates between different asset classes, setting the capital requirements in the standard formula under Solvency II for exposures to Member States' central government to zero. Solvency II may therefore incentivise insurance companies to increase their exposure to government bonds and decrease their exposure to corporate bonds.

Capital market regulation is also evolving towards more transparency and centralised clearing, facilitating the improved assessment and management of risks related to the environment of low interest rates. Since the financial crisis, changes to the capital market regulation, most notably EMIR, have enhanced the transparency and resilience of financial markets. Many market segments have moved to a centralised clearing regime, increasing overall resilience. Stress testing the crucial nodes of the network has been introduced, enabling supervisors to better assess and manage risks. Furthermore, detailed EU-wide data on individual trades have become regularly available to the designated supervisory authorities, which further enhance the ability of supervisors to react promptly to trends that could threaten financial stability.

Section 3
Cross-sectoral perspective in the low interest rate environment

Key take-aways: *The overall assessment of the impact of the low interest rate environment on the financial system should take a holistic and system-wide perspective, taking into account the optimal allocation of interest rate risk and the effect on the broader economy and household wealth. Channels for cross-sectoral risk spillovers include linkages among sectors via direct exposures, as well as further links such as institutional set-up (conglomerates) or links via exposures to correlated assets (financial markets). A broader implication is that risks related to longer-term returns on assets are transferred from the intermediating financial sector to households. A protracted period of low interest rates might be expected to affect both households and non-financial corporations both directly and indirectly.*

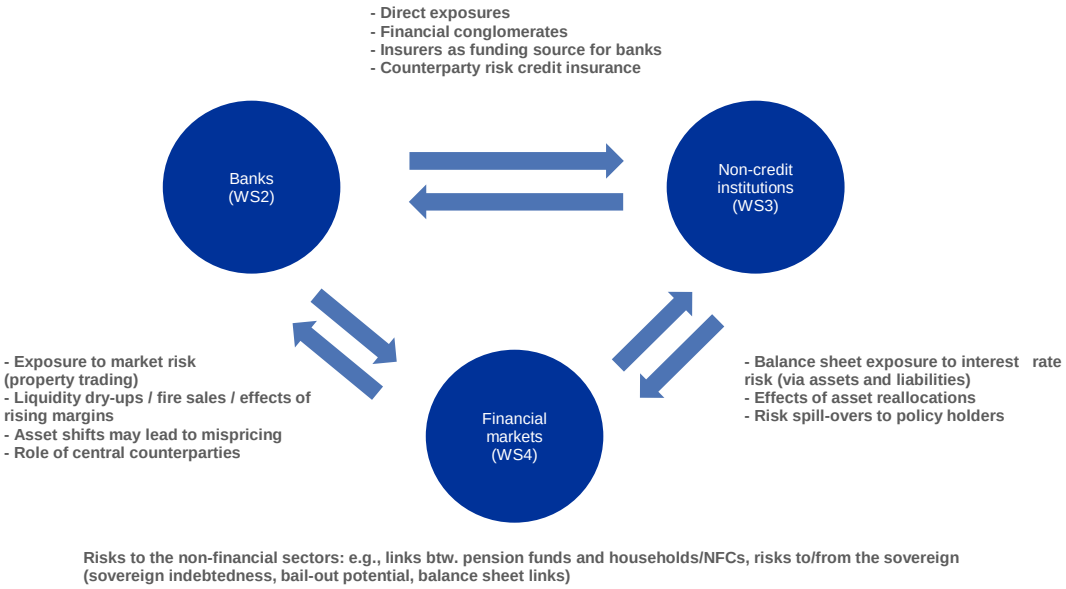
3.1 Interconnectedness and structure of the EU financial market

The impact of the low interest rate environment on the financial system is heterogeneous across countries, depending on the structural characteristics of the financial system and asset quality. EU countries place differing importance on business models with guarantees for longer-term returns on assets (guaranteed-return life insurance and defined-benefit pension funds), which implies differences in the level of vulnerability of financial systems to the low interest rate environment. Also, links to financial markets are heterogeneous, as measured, for example, by the reliance on market-based financing, the share of unit-linked investments in pension and insurance portfolios, as well as the importance of floating-rate loans. Moreover, the resilience of the banking sectors varies, in relation to asset quality, reflecting, for example, differences in mortgage loan portfolio performance. A detailed country overview of relevant financial sector vulnerabilities and economic sector indebtedness indicators is shown in Chart A.32 in the Annex.

Channels for cross-sectoral risk spillovers include linkages among sectors via direct exposures, as well as further links such as institutional set-up (conglomerates) or links via exposures to correlated assets (financial markets). As banks, non-banks and financial markets are closely related, the risks materialising in one sector can be propagated to other sectors (see Chart 1). In addition, the linkages can also help to alleviate some of the negative consequences of risks related to the low interest rate environment, e.g. through a diversification of business models. An analysis of the relevance of specific cross-sectoral linkages supports an assessment of the potential for risk spillovers from the sectors and business models that are the most vulnerable to the low interest rate environment. Apart from direct linkages via exposures and institutional set-up, it is important to assess linkages via exposures to correlated assets (financial market pricing), i.e. the fastest channel of risk propagation. Overall, the low interest environment and a faster evolution of the system towards a market-based model point to the increased importance of risks originating in financial markets. In particular, interconnectedness is rising through common exposures to correlated assets.

Chart 1

Channels for risk spillovers across sectors of the financial system



Source: ESRB.

In terms of direct and institutional exposures, links among banks and non-banks are significant and the spillover potential of risks may have increased recently. Data on direct cross-sectoral exposures show that there are particularly strong links between insurers/pension funds, asset managers and banks (see Charts A.15 and A.16).[15] In the low interest rate environment, risks materialising in the insurance/pension funds sector may, in turn, propagate to banks and asset managers. Specifically, the insurance sector is an important source of funding of MFIs in several EU countries (see Chart A.17), which suggests that these countries are particularly vulnerable to cross-sectoral risk spillovers. Additionally, although available data point to limited direct exposures between banks and asset managers, institutional linkages via financial conglomerates are substantial (see Chart A.18). In fact, the spillover potential between individual asset managers and banks seems to have increased during the recent period of low interest rates (see Chart A.19). From a cross-border perspective, risks materialising in one sector in one country may also be transmitted across borders with a strength that is non-negligible (see Chart A.20 for an example for banks). The low interest rate environment is likely to increase these linkages, e.g. via increased leverage and exposures to more correlated assets. Should vulnerabilities related to the low interest rate environment materialise in several sectors and be exacerbated by cross-sectoral spillovers, there is a non-negligible risk that it will not be possible to deal with sector-wide vulnerabilities at individual firm level.

Consolidation and concentration fostered by the low interest rate environment is likely to further strengthen cross-sectoral interconnectedness. In the banking sector, low profitability and limited opportunities to raise equity in primary markets could result in mergers and acquisitions within the EU. Given evidence that the EU banking sector is too large, trends towards consolidation would be a welcome development, provided that they do not exacerbate the too-big-to-fail problem or unduly restrict competition. In addition, non-credit institutions might accelerate mergers and acquisitions given the depressed investment returns in the low interest rate environment. This could particularly affect businesses that are concentrated in the most vulnerable products, e.g. less-

[15] ESRB (2015): A mapping and risk metrics framework for the EU shadow banking system, Version 24 June 2015.

diversified life insurers with guaranteed returns. If the consolidation trends affect cross-border and cross-sectoral operations, cooperation among supervisory authorities might face challenges, and this would need to be addressed going forward.

The environment of low interest rates could tighten cross-sectoral links via financial markets by increasing correlations in a context of crowded positions and a search for profit. The low interest rate environment may affect market valuations, foster an underpricing of risks and incentivise risk-taking, particularly in the initial phase of interest rate falls. Under the "low for long" scenario, vulnerabilities build up in parts of the financial and non-financial sectors (e.g. lower resilience of the life insurance, pension fund and banking sectors, public and private indebtedness that is high and not declining, lower profitability of the non-financial sector given a prolonged period of low growth), while the risks may become underpriced due to high investor demand and low funding costs (see Charts A.21-A.24). As a result, a reassessment of risk premia may be triggered rapidly and could affect a large part of the financial system via changing market valuations. These effects may be transmitted through high correlations across sectors and through losses on accumulated exposures to similar asset classes.[16] An example of such an event was seen during the August 2015 financial turmoil in China (see Chart A.25). Linkages between banks and real estate markets[17] could provide an additional channel for transmitting re-pricing risk.

Channels of contagion may arise between different sectors, in particular between banks and investment funds. A greater reliance on non-bank credit intermediation, combined with both banks and NCIs increasingly undertaking market-based activities to boost revenues, creates possible contagion channels between different sectors, in particular banks and investment funds. An illustration of the expansion of these channels is the recent growth in EU securities lending activity[18], which reflects bank capital requirements and increased demand for high-quality collateral, while also allowing buy-side firms to improve their returns though securities lending fees given that traditional investments yield low returns.

Growth in the asset management sector could support greater interconnectedness in the financial system through direct exposures, cross-sectoral activities, or vertical integration. As at end-2014, European asset management companies managed EUR 10 trillion in discretionary mandate assets, i.e. around half of their total assets under management, with 39% of discretionary mandate assets from insurance companies and 33% from pension funds[19]. Meanwhile, the investment fund industry has averaged 10% annual growth over the past four years[20], with the sales volumes mainly benefitting equity funds, bond funds and mixed funds.

The growth of the investment fund industry has implications for financial conglomerates from a risk management perspective. When asset management activities are consolidated within banking or insurance groups, the guarantees provided to client investors may force these groups to act as a backstop, impacting their solvency. When asset management activities are unconsolidated,

---

16 For example, insurance corporations, pension funds and investment funds have further increased their exposure to bond and equity markets. Insurance corporations and pension funds have increased their holding of securities and shares from EUR 3.3 trillion in the first quarter of 2008 to EUR 4.8 trillion in the fourth quarter of 2014. In total, insurance corporations, pension funds and investment funds have increased their exposure to stock and bond markets from 53% in the first quarter of 2009 to 56% in the first quarter of 2015 (this comparatively small structural change accounts for EUR 5.6 trillion).

17 Banks in EA remain noticeably exposed to activities closely related to the real estate sector. Loans for households for house purchases, loans for real estate and construction activities constituted 42% of total banks' assets within EA at the end of 2014 (see chart D). At the beginning of 2013 the above-mentioned share was nearly 38% and is now close to the levels seen just before the financial crisis. Due to the low interest rate environment and growth of mortgage loan availability (since 2014 lending standards in EA have softened) in general evidence was found of real estate price overvaluation in some countries. In the case of unfavourable changes in interest rates real estate assets prices could decrease (or return to fundamentals) and this could lead to additional losses for the banking sector in EA and other EU countries.

18 See ESMA Report on Trends, Risks and Vulnerabilities No1, 2016.

19 See EFAMA Asset Management in Europe, 8th annual review (April 2015).

20 See EFAMA Quarterly Statistical Release, Q4 2015.

the existence of implicit guarantees and "step-in" risks (for reputational reasons) may lead to similar outcomes, but without the prudential requirements that are in place for consolidated groups.

Systemic sensitivity to liquidity risk is likely to increase further as a broader consequence of structural changes fostered by the low interest rate environment. Traditionally, liquidity risk has been concentrated in the banking sector and in shadow banking activities such as certain types of money market funds, real estate funds, special purpose vehicles, securities financing and lending activities, as well as via margin calls in derivatives trading. However, it has been largely absent in other non-banking activities due to the longer-term nature of the contracts (life insurance, pension funds, AIF funds)[21] or the parallel valuation of asset/liabilities and the liquid nature of investments (UCITS funds). However, structural changes may also increase the prominence of liquidity risk in the non-banking sector. In a low interest rate environment, life insurers find it more difficult to offer guaranteed-rate products with rates of return that can compete with the savings products offered by asset managers.[22] This, together with the challenges posed by legacy portfolios with high guaranteed rates of return, could prompt life insurers to switch to unit-linked models.[23] Life insurers' business models and the contractual terms offered would then become similar to those of asset managers and investment funds, increasing competition between the sectors. As they do not contain return guarantees, unit-linked products are broadly similar to asset management/investment fund products in terms of risk-return profile. To stay competitive, life insurance companies might therefore be compelled to offer products with similarly easy redemption conditions to those offered by investment funds, increasing redemption risk. At the same time, the pressure to increase asset yields to cover guaranteed rates on legacy portfolios[24] could increase life insurers' demand for lower-rated and/or less liquid assets.[25] A similar tendency has already been noted for investment behaviour in the asset management/investment funds industry.[26] Increased competition from life insurance would augment this process. In such an environment, search for yield and crowded investment positions[27], e.g. via increased investments in less liquid asset classes and correlated asset price movements, could affect several financial sectors simultaneously. For example, this may lead to a fall in the asset market value of several financial sectors at the same time, which could trigger redemption risk and, in turn, result in fire sales. Since institutions in these sectors have not generally behaved pro-cyclically to date, thereby helping to stabilise the financial markets,[28] this process could constitute a significant structural change.

More broadly, the low interest rate environment could accelerate the transition to a more market-based financial structure. With the appropriate regulatory framework in place, this would improve the economy's resilience to shocks and is in line with the broad policy agenda in respect of the Capital Markets Union. Given profitability pressures and higher risk-taking in the low interest rate environment, the role of banks in the EU financial system is expected to decrease, which is an important development given the current structure of the European financial sector,[29] and is also in line with the broad policy agenda relating to the Capital Markets Union (for more detailed

---

21 These sectors have often acted in a counter-cyclical manner, thus limiting the risks related to fire sales by using an opportunity to buy assets sold by banks at discounted prices.

22 Note that the relevant rates of return can also be influenced by different taxation of the products.

23 For evidence of the rise in importance of unit-linked business see Section C of the Technical Documentation, Section 4.1, especially Chart 7.

24 For evidence of pressures from legacy portfolios see Section C of the Technical Documentation, Section 2.1, especially Chart 1.

25 For evidence of the increased credit and liquidity risk in insurers' portfolios see Section C of the Technical Documentation, Section 3.1, especially Chart 4 and Table 1, as well as Section 3.2.

26 For evidence of higher investment risk in asset allocation of investment funds see Section D of the Technical Documentation, Section 2.a.

27 Competitive pressures in the investment fund industry in an environment of low nominal returns force managers to increase their portfolio risk or leverage in order to offer attractive returns. Cross-sector interconnectedness also seems to be increasing. For details, see Section D of the Technical Documentation, Section 2.a.

28 See, for e.g. "Procyclicality and structural trends in investment allocation by insurance companies and pension funds: A Discussion Paper by the Bank of England and the Procyclicality Working Group", 2014.

29 See also ESRB (2014) "Is Europe overbanked?"

information, see also Box 1 in Technical Documentation, Section D). The shift of activities to the non-banking sector brings benefits as it provides for a "spare-wheel function" i.e. an additional source of finance for the economy in the case of bank shocks. New lending by banks may be constrained due to several factors, including (i) costs in terms of capital requirements for balance sheet expansion, (ii) deleveraging needs, and (iii) forbearance on outstanding loans. At the same time, non-credit institutions could search for yield in investment classes such as consumer credit or mortgage loans (e.g. the bank-originated securitised asset type, or possibly also through direct lending as has already been seen in some countries like the Netherlands, where recently a significant share of mortgage loan intermediation has been performed by non-bank institutions). They could raise funds by offering deposit-like products, since they might be able to offer better conditions to depositors and debtors than banks, e.g. due to more lenient regulatory requirements. Furthermore, increased reliance of non-financial corporations on market-based financing will probably be promoted in the context of the Capital Markets Union.

Notwithstanding the benefits of a more market-based financial structure, potentially emerging systemic risks should be noted and accounted for, as the stability of the non-bank financial sector significantly affects the stability of the EU financial system as a whole. Besides the benefits, the shift towards more market-based financing could also generate some financial stability risks. A number of risk characteristics make the non-bank financial sector systemic. In particular, sources of financial stability risks in the shadow banking sector are found to arise from financial leverage, as typically present in hedge and real estate funds, from maturity and liquidity transformation, especially by some bond funds, and from systemic interconnectedness, e.g. through money market funds and (secured) funding transactions, which involve both regular banking and shadow banking entities and appear as important contagion channels. The interconnectedness of banks with shadow banking counterparties is relatively large and may pose challenges to the macroprudential supervision of the exposures. The EBA's 2015 data collection sheds light on EU banks' exposures to shadow banking counterparties, stressing the limited information that banks have regarding the supervisory treatment of their shadow banking counterparties, and the importance of exposures to non-EU (45%) and non-identified (19%) jurisdictions (for more detailed information, see also Box 1 in Technical Documentation, Section D). Other challenges to the macroprudential supervision of the shadow banking sector relate to the high degree of diversity and the rapid pace of innovation (e.g. of "retail alternative" funds). Limited capacity to assess risks in the shadow banking sector is a key concern for macroprudential policy.[30]

The development of bank-like activities by non-banks implies regulatory arbitrage risks and challenges in terms of monitoring and supervision from a macroprudential perspective, since different regulations will apply to institutions engaged in similar activities. The transition towards a more market-based structure, accelerated by the low interest rate environment, may lead to challenges in terms of the monitoring and supervision of risks in the relatively heterogeneous market-based intermediation sectors. It may lead to a higher homogeneity of products (e.g. unit-linked savings), increased interconnectedness, and sensitivity to market liquidity risk (see also above). In particular, the potential for regulatory arbitrage and increased risk-taking

[30] In its shadow banking risk monitoring, the ESRB uses an entity-based approach focused on Investment Funds (including Money Market Funds) and Other Financial Institutions (namely Financial Vehicle Corporations, Securities and Derivative Dealers, Financial Companies engaged in Lending, and other OFIs). In addition, an activity-based approach is employed, as some financial markets activities may pose shadow banking risks which are not fully captured by an entity-based mapping approach. It focuses on risks from market activities involving leverage, including leverage gained through secured funding and derivatives, and also covers market liquidity and interconnectedness risks. Drawing on underlying market data collections, the framework aims at addressing the financial stability mandate given to EU authorities in several EU directives and regulations adopted since the onset of the crisis, including EMIR, AIFMD, MiFID II and SFTR. See ESRB (2016i and ii). [ESRB(ESRB (2016i): 1st issue of the ESRB Shadow Banking Monitor (SBM) and ESRB (ESRB (2016ii): Methodological Background Note, ESRB Occasional Paper.

via higher leverage[31] calls for the enhanced supervision of risks in the non-banking sector, particularly from a macroprudential perspective. In view of the increased competition among the banking and non-banking sectors, credit intermediation to higher-leveraged households may be facilitated by the non-banking sector (e.g. by purchases of bank-originated ABS or in some cases through direct intermediation), and therefore needs to be closely supervised. In particular, in the low interest rate environment households that are leveraged do not have the incentive to undertake necessary balance sheet adjustments and may forbear deleveraging (e.g. if more borrowing contracts are converted into longer-term contracts), keeping debt at levels that might not be sustainable, even when accounting for lower debt servicing costs.[32] Non-bank entities may be in a better position to provide credit to leveraged households, because they are not, in some cases, subject to the same regulatory standards as the banking sector.

Lack of transparency in some markets or for some types of transactions and the limited disclosure of ultimate entities bearing risks are features of vulnerability and are potential sources of regulatory arbitrage. The risk may be aggravated by a large reliance on repo or money market funding, the expansion of derivatives trading activities and the limited availability of high-quality collateral. Diversification of funding sources may help to stabilise markets. Also, developing collateral management activities to improve collateral fluidity may contribute to financial stability.

3.2 Broader links to non-financial sectors and the re-allocation of risks

A protracted period of low interest rates could be expected to affect both households and non-financial corporations directly (e.g. through a redistribution between net borrowers and net savers) and indirectly (e.g. via its impact on financial sector profitability and on growth). The direct effects relate mostly to risk redistribution, redistribution of wealth as well as a change in incentives for debt accumulation. In particular, net borrowers experience a reduction in interest rate payments on debt, while savers or asset holders see a decrease in net income. Apart from the direct effects, second-round effects could be expected as each financial sector, most notably the banks, is strongly interlinked with households and non-financial corporations (see Charts A.25 and A.26).[33]

The impact of the low interest rate environment on households is heterogeneous across countries, depending on the size and the structure of financial wealth. Household balance sheets are heterogeneous across EU countries in terms of the amount of accumulated financial wealth and its distribution (see Chart A.11).[34] The low interest rate environment could have a significant impact on both the amount and the composition of household financial wealth. In the initial phase of the low interest rate environment, overall financial wealth increases due to asset price booms, but this effect is distributed very unevenly and may be reversed under a “back to

---

31 See also discussion and evidence in Section 2.2. For further analysis, see also Technical Documentation, Section D, as well as the related analyses of other ESRB sub-structures, e.g. the package to Q2-ATC “Liquidity, market making and leverage” prepared by the Joint ESRB ATC/ASC Expert Group on Shadow Banking and the ESRB Market Liquidity Expert Group.

32 In fact, the quarterly bottom-up survey of ESRB Member Institutions shows that the risk related to deteriorating debt sustainability is currently one of the main risks to financial stability, which the low interest rate environment is likely to increase further due to, e.g. subdued growth (denominator effect). Also, incentives to reduce debt (e.g. by households) are missing, because borrowing costs are very low and real returns on savings are negative.

33 In recent years the links among sectors have changed. As was also discussed in Section 2.1, banks declined to grant loans, in particular to the non-financial corporate sector. At the same time, NFCs raised borrowing from other NFCs (most probably other closely linked companies), also increasing borrowing from those other than banks and financial institutions.

34 While financial wealth in transition economies such as Poland is relatively low, it is over four times annual household consumption for countries such as Italy, the United Kingdom, Belgium and Sweden. Also, the composition of financial wealth is quite diverse. Low-yielding assets such as currency and deposits represent a large share of financial wealth in Spain and Austria. Households in Belgium and Sweden have significant exposure to historically more volatile assets such as shares, other equity and mutual funds.

normal" scenario, when asset prices are likely to fall. In the second phase, if consumption responds with greater sensitivity to asset price declines, the risk rises of negative feedback to the real economy and further falls in asset prices. This effect would be expected to be fairly small.[35] With regard to the distribution of wealth, a protracted scenario of low interest rates is likely to encourage search-for-yield behaviour, similar to the impact observed in the financial sector, at least until households fully internalise the new normal. In particular, households are likely to shift savings from low-yielding currencies and deposits into higher-yielding fund shares or real estate. Finally, the "back to normal" scenario could lead to a decrease in households' financial wealth, depending on to what extent they had previously invested in assets with long maturities, since the low interest rate environment is likely to push some financial asset prices above levels consistent with the fundamentals.

In the environment of a prolonged period of low interest rates, sectors that are excessively leveraged do not have incentives to make necessary balance sheet adjustments, which might increase the risks of potential financial instability for the economic system as a whole, particularly if interest rates were to rise again[36]. The "low for long" interest rate environment might provide an incentive for borrowers to forbear deleveraging and keep debt at present levels. In fact, a survey of ESRB Member Institutions shows that the risk of deteriorating debt sustainability is currently one of the main risks to financial stability, and might increase further under the low interest rate environment (see Table 1 above). Under the scenario of increasing interest rates, maintaining a debt burden might prove to be unsustainable if borrowers cannot meet their obligations or if they default. The low interest rate environment, despite lowering interest payments, incentivises frontloading or even increasing public indebtedness (see Charts A.28-A.29).[37] In a situation of reduced fiscal space and the possible emergence of sector-wide vulnerabilities, a risk transfer to households via the public sector balance sheet becomes increasingly likely.[38] In addition, second-round effects could materialise, e.g. through the re-pricing of sovereign debt and the consequent impact on the financial sector via government debt holdings.[39]

In the household sector, net borrowers benefit from low interest rates, while net savers lose. They bear increasing credit risk due to (i) a lack of incentives for borrowers to deleverage, and (ii) a lack of compensation for the increasing credit risk held by net savers. As financial intermediaries are expected to withdraw from assuming financial risks related to longer-term returns on assets, these risks will be re-allocated to households. Also, within the household sector, in a prolonged period of low interest rates, households that are leveraged (net borrowers) do not have any incentive to make necessary balance sheet adjustments and may forbear deleveraging (e.g. if more borrowing contracts are converted into longer-term contracts), keeping debt at levels which are not sustainable, even when accounting for low debt service costs.[40] Additionally, households will be incentivised to borrow as early in the life cycle as possible, given that borrowing costs are very low and real returns on savings are negative. These developments may be exacerbated if economic agents continue to predict increasing growth, before fully recognising the characteristics of the scenario of ultimate equilibrium. At the same time, households that are net savers are not

35 Still, wealth effects in Europe tend to be small. As shown in Sousa (2009), the marginal propensity to consume out of financial wealth typically ranges in the euro area between 0.7 cents per euro (the immediate response) and 1.9 cents per euro (the long-run impact) and consumption is also strongly responsive to changes in financial wealth: a 10% increase in financial wealth leads to an increase of between 0.6% and 1.5% in consumption.

36 European Parliament, DG for Internal Policies (2013), Impact of a low interest rate environment, Monetary Dialogues, February 2013, IP/A/ECON/NT/2013-01.

37 For a broader discussion of these effects, see ESRB (2015): Issues note, ATC 19, 21 August 2015.

38 See also German Council of Economic Experts (2014/2015).

39 See Charts A.30-A.31 and, for further discussion, ESRB (2015): Issues note, ATC 19, 21 August 2015.

40 In fact, the survey of ESRB Member Institutions (see also Table 1 on page 12) shows that the risk related to deteriorating debt sustainability is currently one of the main risks to financial stability, which the low interest rate environment is likely to increase further.

compensated for the increasing credit risk they bear. Overall, in the low interest rate environment net borrowers benefit and net savers lose, and also bear increasing credit risk.

If the potential risks described in this report were to materialise, for example in the life insurance or pension funds sectors, the relevant costs could be transferred to the younger generation. The low interest rate environment, while lowering interest payments, encourages increasing public indebtedness. Potential risks materialising in certain sectors could put pressure on public balance sheets. For example, in a situation where defined-benefit pension funds had become unviable, policies to allocate the cost of this would need to be considered. If net savers, i.e. older households, are not in a position to bear the whole cost of such risks materialising, the transfer to the younger generation, e.g. via the public balance sheet, could be one of the far-reaching consequences of the low interest rate environment.

Section 4
Key risks related to the low interest rate environment

Key take-aways: *Among the key risks to EU financial stability, several relate to the low interest rate environment and, under a "low for long" scenario, are likely to increase further. The impact of the low interest rate environment on the financial system can be assessed in two steps, taking into account first-round and second-round effects. First-round effects involve the direct impact of the low interest rates on particularly vulnerable financial sectors as well as on non-financial corporations and households, affecting consumption and investment decisions. Second-round effects involve an indirect impact via cross-sectoral interconnectedness, where risks spill over across sectors. As a consequence of the shift towards market-based financing, as well as more similar business models and the resulting lower diversity of the financial system, market liquidity risks may become more significant. Overall, the protracted low interest rate environment may translate into systemic risks to financial stability related to (1) the sustainability of business models, (2) broad-based risk-taking, and (3) a change in the structure of the financial system. Resilience, funding/liquidity risks and interconnectedness are identified as first-order policy issues.*

4.1 Summary of regular ESRB risk monitoring

Several of the key risks to EU financial stability, as regularly identified by the ESRB Member Institutions, can be linked to the low interest rate environment (see Tables 1 and 2, as of April 2016). The survey does not reveal exactly why an ESRB Member Institution might consider a certain risk to be high or low. The rationale may reflect a variety of interrelated factors, most notably the weak growth outlook and structural issues. However, both the "low for long" and the "back to normal" interest rate scenarios could significantly influence the probability of one or more of these risks materialising. In particular, in the life-insurance sector with guaranteed-return products, risks are very sensitive to the "low for long" scenario. However, the impact of low interest rates on bank profitability, asset quality and sovereign debt sustainability is more ambiguous. The risks of low interest rates could outweigh the benefits, but only under certain conditions, which could apply to banks if declining net interest margins were not compensated for by higher non-interest income and asset valuation gains. It would apply to sovereign debt sustainability if low interest rates were incentivising debt-financed spending, with no corresponding increase in future tax income. A reassessment of (global) risk premia, triggered by any shock, could be more severe after a protracted period of low interest rates if common exposures and leverage had been building up amid low market price volatility and high asset price correlation. From a cross-country perspective, some of the risks that characterise the prolonged environment of low interest rates, including debt sustainability concerns and weak profitability, seem to be currently clustered in some groups of countries, according to the domestic institutions (Table 2). From an EU-wide perspective, the homogeneity of the risk assessment is consistent with strong concerns over potential cross-border spillovers and second-round effects spreading from the directly affected countries to others.

Table 1

ESRB bottom-up survey: an assessment of the main financial stability risks from an EU-wide perspective

		Average assessment					Expected severity (EU-wide)																												
	Risk	Severity	Probability	Potential impact	Ability to mitigate	Policy priority	AT	BE	BG	CY	CZ	DE	DK	EE	ES	EU	FI	FR	GR	HR	HU	IE	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	SE	SI	SK	UK
1	Reassessment of global risk premia	4.4	4.4	4.3	2.3	3.0	4	4	5	4	4	5	4	4	5	6	5	4	5	3	4	5	5	5	4	5	4	5	5	4	6	4	4	4	4	4
2	Weak bank profitability/ asset quality	4.3	4.3	4.3	3.0	3.9	5	4	4	4	5	5	4	4	5	5	5	4	4	4	5	5	4	5	4	4	5	3	4	4	5	3	4	4	4	4
3	Geopolitical risk	4.0	4.2	4.0	1.9	2.7	5	4	4	3	5	4	5	3	4	5	4	4	4	4	4	4	5	4	3	4	5	4	4	5	5	3	4	5	3	4
4	Sovereign debt sustainability	3.9	3.7	4.1	2.9	2.5	4	4	4	4	4	4	0	4	3	4	4	4	3	3	4	4	5	4	5	5	4	4	4	5	5	3	4	3	3	4
5	Corporate debt sustainability	3.8	3.4	2.8	2.8	3.1	4	4	4	4	4	4	0	4	3	5	4	4	4	3	3	4	5	4	3	3	4	3	5	2	5	3	4	3	4	4

Note: ESRB bottom-up survey (July 2016). The table shows the relevance of selected pre-defined EU-wide systemic risks, as assessed by Member Institutions. Averages (computed across all countries) of severity, expected likelihood, impact, ability to mitigate and policy priority are reported in the left panel. The right panel reports assessments of severity in each country. The risks are sorted by average severity (first column, five risks with the highest severity shown). Severity combines the probability of a risk materialising and its impact once it materialises, discounting for the ability to mitigate such risk. Overall, 45 responses from 29 countries were received for the July 2016 bottom-up survey. Results for each country are the average of responding institutions within the country, EU averages are computed with equal country weights.

Table 2

ESRB bottom-up survey: an assessment of the main financial stability risks from a domestic perspective

		Average assessment					Expected severity (domestic)																												
	Risk	Severity	Probability	Potential impact	Ability to mitigate	Policy priority	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HR	HU	IE	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	SE	SI	SK	UK
1	Reassessment of global risk premia	3.9	4.1	3.7	2.3	3.0	5	3	2	3	3	4	4	3	5	4	5	4	3	5	4	5	3	3	4	3	5	5	4	6	5	4	5	2	4
2	Weak bank profitability/asset quality	3.9	3.9	4.1	3.0	3.9	5	4	4	5	3	4	4	3	5	2	5	6	3	4	4	5	3	4	3	4	3	4	4	5	4	4	5	4	3
3	Geopolitical risk	3.7	4.1	3.7	1.9	2.7	5	3	4	5	4	3	4	3	3	4	4	3	3	3	4	5	4	3	5	3	4	4	4	4	4	3	3	0	4
4	Corporate debt sustainability	3.6	3.2	3.8	2.8	3.1	4	3	4	5	4	4	4	4	3	3	4	6	4	3	3	5	2	3	2	3	3	4	2	5	4	3	3	4	4
5	Household debt sustainability	3.6	3.3	3.8	3.2	3.7	4	4	2	5	4	4	4	3	3	5	4	6	3	4	4	3	2	3	2	3	3	5	2	4	4	4	2	4	4

Note: ESRB bottom-up survey (July 2016). The table shows the relevance of selected pre-defined systemic risks, as assessed by Member Institutions. Averages (computed across all countries) of severity, expected likelihood, impact, ability to mitigate and policy priority are reported in the left panel. The right panel reports assessments of severity in each country. The risks are sorted by average severity (first column, five risks with the highest severity shown). Severity combines the probability of a risk materialising and its impact once it materialises, discounting for the ability to mitigate such risk. Overall, 45 responses from 29 countries were received for the July 2016 bottom-up survey. Results for each country are the average of responding institutions within the country, EU averages are computed with equal country weights.

4.2 Key risks from a cross-sectoral perspective

The low interest rate environment may contribute to systemic risk in the EU financial system through common exposures and contagion effects. This section looks at systemic risk from a cross-sectoral perspective. The analysis considers five risk dimensions: (1) Resilience, where the capacity to absorb shocks, either with recurring profits or with buffers of capital and liquid assets, is the main factor counteracting systemic risk. There are various complementary regulatory requirements, e.g. minimum standards for risk management, large exposure limits and resolution plans for systemically important institutions. However, capital requirements are often an efficient way of internalising the cost of negative externalities in market prices. (2) The credit/financial cycle refers to the time dimension of systemic risk. Experience from numerous crisis episodes suggests that a combination of rising leverage, concentrated credit exposures and elevated asset prices provides noticeable early warning signals. (3) Funding and liquidity/maturity transformation are assessed as a separate risk dimension. Liquidity issues can play an important role in asset price correlation as well as contagion during a crisis. In the pre-crisis period there may be a pro-cyclical erosion of liquidity risk management standards, while from a structural perspective it is also necessary to correct misaligned incentives resulting from expectations that a central bank could be a provider of emergency liquidity. (4) Risk concentration/market structure comprises the too-big-to-fail problem of individual institutions and the impact of less diversity on the behaviour of different market participants. (5) Interconnectedness between sectors could result from lending, funding and other financial contracts with counterparties from different sectors. Interconnectedness can also result from common exposures to correlated assets.

4.2.1 Resilience

A protracted low interest rate environment is likely to exert broad-based pressure on the profitability and the solvency of entities in the banking sector, insurance companies and pension funds, as well as on non-financial corporates and households. To some extent, an adjustment to this environment could be achieved by modifying financial entities' existing business models, e.g. by improving efficiency via outsourcing and technological innovation. However, deeper structural adjustments could require orderly market exits. In this context specific cross-sectoral risks could emerge if the current sector frameworks for managing orderly market exits were not able to handle a large consolidation wave in a weak economic environment. The failures or impairment of a number of (large) financial institutions could send shocks through the financial system which, in turn, could harm the real economy. Mergers and acquisitions are the traditional methods for managing orderly consolidations. However, there may be various obstacles to this and there is no guarantee that a purely market-driven process of mergers and acquisitions could produce a sufficiently resilient structure before any major adverse shock had to be absorbed. A severe risk scenario could be as follows. First, policymakers underestimate the consolidation needed in the system to achieve a sustainable level of profitability. Second, they underestimate the obstacles to a timely market-driven consolidation process through mergers and acquisitions or other orderly market exits. Third, they overestimate the ability of existing sector resolution frameworks to contain contagion effects and second-round effects in the presence of widespread solvency issues and weak economic growth.

Profitability pressures in the protracted low interest rate environment are likely to lead to an increase in risk-taking and search for yield behaviour. There are various explanations for this. One factor could be asymmetric information, for example, between the financial intermediaries (agents) and the households (principals). Misaligned compensation for financial services could result in higher risk-taking than that suggested by households' long-term preferences. "Gambling for resurrection" would be an extreme form of this, while efforts to deliver on contractually "guaranteed" absolute returns could provide a similar motivation. Another factor is that households could

overestimate the rate of riskless returns, which may be influenced by historical averages rather than current conditions. In addition to these misalignments, there may also be a case for intervention if observable risk premia for financial assets are only consistent with a best-case scenario, even though there may be considerable uncertainty regarding structural weakness in the economy, unsustainable business models, increasing competition and incomplete knowledge of the allocation of risks in the system. In the pre-crisis period before 2007, the pricing of credit risk reflected this type of best-case scenario, although there was significant uncertainty surrounding the robustness of the new risk-transfer system, which had never been tested through a full default cycle.

Increased risk-taking and search for yield behaviour affect risk premia and, as a consequence, the allocation of risks in the financial system. From a cross-sectoral perspective, a first risk scenario would be excessive risk-taking resulting in risks being accumulated in sectors and entities with inadequate risk management and resilience. Over a full financial cycle it could become evident that fundamentally sustainable business models are being quickly "priced out" of the market by more aggressive competitors, who do not survive the full cycle themselves. For example, leveraged investors may pay higher asset prices in the build-up phase of a boom than "real money" investors. This is accentuated if leveraged financing is extraordinarily cheap during a period of low interest rates. In fact, the financing of leveraged positions could be provided by another sector (e.g. a bank as prime broker for a hedge fund, a pension fund lending securities to a hedge fund via an intermediating bank, an insurance company as a lender to a real estate developer via a CMBS investment). A related, second cross-sectoral risk scenario would result from the feedback of market indicators into many financial institutions' risk management systems. The search for yield could compress the price of hedging against adverse asset price changes and asset price correlations. Inasmuch as market participants may not actually buy this cheap protection against tail events, instead interpreting the market signal as indicating an extremely low actual probability of the risk materialising, they might use this as a justification to raise their exposures, without seeming to increase their risk. In terms of resilience this would create a misleading sense of security.

Concerns over the expansion of shadow banking activities mostly reflect the assessment of increased risk-taking and the potential misallocation of risks in the system. The FSB (2015)[41] broadly describes the shadow banking system "as credit intermediation involving entities and activities outside of the regular banking system. Intermediating credit through non-bank channels can have important advantages and contributes to the financing of the real economy, but such channels can also become a source of systemic risk, especially when they are structured to perform bank-like functions (e.g. maturity and liquidity transformation, and leverage) and when their interconnectedness with the regular banking system is strong." In a low interest rate environment persistent pressure on bank profitability could reinforce attempts to economise on the use of regulatory capital by shifting risks to shadow banking as an alternative business model (see also Section 3.1). The specific characteristics of these transactions and the risk management practices in the shadow banking entities should be used to assess whether this constitutes undesirable regulatory arbitrage: more transparency may be needed to make this assessment. Beyond this, systemic resilience will need to be reviewed if shadow banking evolves from a fringe activity to become, in reality, a core provider of financial services. In a risk scenario the pro-cyclicality of more market-based intermediation could increase and links between banks and shadow banking could prove to be so close that the diversification benefits of a combined system of market-based and bank-based intermediation fail to materialise. In that case the system's resilience after its structural transformation could be overestimated.

41 FSB (2015), Global Shadow Banking Monitoring Report 2015, page 1.

Against this backdrop resilience is considered to be a first-order policy issue from a cross-sectoral perspective. How the risks will actually evolve in the longer-term is highly uncertain, so a macroprudential policy strategy should thoroughly consider the costs and benefits of doing too much too early versus doing too little too late. This section outlines some distinct risk scenarios in a low interest rate environment with potential costs that are severe enough to recommend specific policy reviews at this juncture. In particular, it should be ensured that in all sectors and for all activities the calibration of capital requirements (including leverage ratios) and the management of the market exits of entities reflect potential cross-sectoral contagion effects and common exposures in a weak economic environment.

4.2.2 Credit/financial cycle

With the exception of government bonds, a widespread credit boom is unlikely, given subdued growth and low private sector credit demand. Nevertheless, a country-specific build-up of some cyclical imbalances is possible. Strong demand for real estate could be fuelled by either pro-cyclical risk-taking or a flight to seemingly safe assets as an alternative to negative yielding government bonds and other forms of retirement savings. In addition, favourable conditions for longer-term funding could drive a credit-asset price spiral. Historically, the bursting of real estate bubbles has often been linked with severe crises that impose high costs on the financial sector and the real economy.

From a cross-sectoral perspective common exposures and negative feedback between the financial sector and the real economy stand out as the main risks. It is not only the banking sector that is exposed to real estate markets and mortgages – insurance companies, pension funds and investment funds could easily increase their exposure to this asset class. Other channels through which a real estate shock could spread through the system include a wealth-and-consumption effect on households and the collateral valuation-and-investment effect on non-financial firms. A specific risk scenario in this context could be the further accentuation of the wealth effect in a regime where more investment risks have been shifted from life insurance companies and pension funds to the household sector. Furthermore, household income growth would be relatively weak in a protracted low interest rate environment. This could have negative implications for the creditworthiness of households, and would, in turn, be mirrored by deteriorating asset quality on credit institutions' balance sheets. This risk scenario could also involve the inefficient allocation of capital. In ageing societies, building new housing may not contribute to higher income in the future, and if such activities with very low, or even negative, productivity are debt financed it will leave the economy more vulnerable to adverse income shocks in the long term.

Risks related to the credit/financial cycle is viewed as second-order policy issues from a cross-sectoral perspective. The nature of the risk is more country-specific than EU-wide. The macroprudential monitoring and policy tools available at country level appear to be relatively well developed, particularly for the banking sector. Moreover, in a number of countries initiatives to complete the tool kit are in progress, providing better data on lending standards and instruments that can also contain risks in the shadow banking system, e.g. loan-to-value ratios at mortgage contract level. The main remaining risk is the underestimation of negative feedback between the financial sector and the real economy if this has not been adequately modelled in stress tests.

4.2.3 Funding and liquidity/maturity transformation

Funding and liquidity risks are a major channel of cross-sector contagion, and are closely interrelated with various other risks identified for individual sectors. For example, the materialisation of liquidity and funding risks could either trigger or reinforce the failures of

(numerous) financial intermediaries. An inability to value securitised assets in 2007 resulted in the freezing of investment funds, sharply higher haircuts on these assets as collateral, sharply higher risk premiums for counterparty risk, illiquidity in credit risk transfer markets, the failures of off-balance sheet vehicles, the failures of mortgage lenders, specialised insurance companies and exposed commercial banks, the freezing of wholesale funding markets, the failures of investment banks, and the failures of more commercial banks and other financial institutions, including the subsidiary of a global insurance company that had been hit by large margin calls (see also Section 3.1).

Looking forward, overestimating the resilience of market liquidity during stressed periods would be a major risk scenario when the low interest rate is acting as a catalyst in the transition to more market-based intermediation. Forecasting the resilience of liquidity during periods of stress is particularly challenging if historical experience is based on a different market structure. Regulation may have changed the behaviour of market makers. Asset managers may be substituting banks as market makers in the good times, but may stop doing this during stressed periods. In fact, asset managers themselves could face redemption risk during periods of stress. Consolidation in the financial sector amid persistently low profitability could make market liquidity more dependent on the behaviour of individual institutions. The resilience of market liquidity may also depend on the features of new trading platforms, the widespread use of trading algorithms and the availability of central clearing as an alternative to the more unpredictable OTC markets.

Broad-based risk-taking that exceeds risk bearing capacities (search for yield) can take the form of accumulating concentrated positions in increasingly complex assets and financing structures. These positions tend to become illiquid when their fundamental values are called into doubt. Asset correlation may be driven partly by liquidity risk premiums and could increase in situations where many market participants are seeking to unwind their common exposures simultaneously. Moreover, the use of leverage, which can be cheap in a low interest rate environment, increases the likelihood of fire sales driving an adverse liquidity spiral.

Funding and liquidity risks are viewed as a first-order policy issue from a cross-sectoral perspective, and cannot be adequately assessed from a sectoral perspective. In this respect a major concern is that there is currently no regular systematic approach for monitoring the factors that influence market liquidity resilience during periods of stress. Moreover, macroprudential instruments that might be able to address liquidity-related vulnerabilities are generally not well developed for the non-bank financial sectors.

4.2.4 Risk concentration/market structure

One form of risk concentration is the too-big-to-fail problem in the financial sector. Adequate regulation, as discussed in Sections 4.2.1 (resilience), 4.2.3 (liquidity) and 4.2.5 (interconnectedness), reduces the probability of default, minimises and internalises the negative externalities of a default, and so corrects misaligned incentives for market participants to take excessive risks.

Another form of risk concentration in the low interest rate environment could result from low institutional diversity and could interact with other identified risks. Business models engaged in the intermediation of savings allocation may become less diversified. In particular, the favourable risk-reward profile of unit-linked investment products, asset management services in general, and selling alternatives to bank-deposits could be seen as an attractive business model by intermediaries from different financial sectors. Within this class of services the specifics of unit-linked products could converge further. This would have two main implications: first, investment risks would be directly shifted to end-investors, i.e. households, and second, similar behaviour in the financial system would accentuate pro-cyclicality and reduce resilience in periods of stress.

Risk concentration/market structure is viewed as a second-order policy issue from a cross-sectoral perspective. It may be difficult, in practice, for microprudential supervisors to translate expectations for broader market trends into concrete decisions. For example, supervisors assessing the sustainability of institutions' business plans need to consider whether the plans are based on realistic assumptions concerning how profitable specific activities would be if a high number of competitors also expanded in a particular area. However, given how difficult it is to quantify this risk dimension with any accuracy and to operationalise any specific cross-sectoral recommendation, a prudent approach could be to implement a more generally robust framework of resilience and orderly market exits. With regard to the household sector, the low interest rate environment reinforces the argument for improving financial literacy and the readability of risk information protocols for financial products.

4.2.5 Interconnectedness

Risks originating in financial markets are expected to increase in a low interest rate environment. As a broader consequence of a more market-based financial structure, interconnectedness across sectors is likely to increase due to stronger indirect links through exposures to correlated asset prices or through direct exposures (see also Section 3.1). It has been argued previously (Section 4.2.1) that for the supervisory monitoring of systemic risks to be effective, an improved understanding is required of the interconnectedness of shadow banks. At the moment, many regulators in the EU are without access to sufficiently complete and granular data or well-developed stress testing tools to regularly assess changes in the level of systemic risk stemming from shadow banking activities. In particular, many of these activities have a cross-border dimension. Similarly, a systematic approach should be followed that regularly assesses the drivers of asset price correlations and their potential impact on different parts of the financial system.

Interconnectedness is viewed as a first-order policy issue from a cross-sectoral perspective. The main concern is that the regulators' and market participants' stress tests often fail to model interconnectedness explicitly and comprehensively. This could result in systemic risks being underestimated.

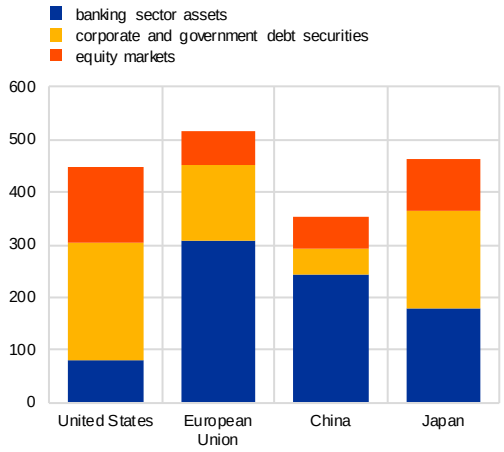
Section 5
Conclusion

A holistic macroprudential policy approach is required to strengthen financial stability in a low interest rate environment that will probably persist for years to come. From this perspective, resilience, funding/liquidity risks and interconnectedness have been identified as first-order policy issues. In particular, it should be ensured that, in all sectors and for all activities, the calibration of capital requirements (including leverage ratios) and the management of market exits by entities reflect potential cross-sectoral contagion effects and common exposures in a weak economic environment.

Chart Annex

Chart A.1
Size of the financial sector and capital markets

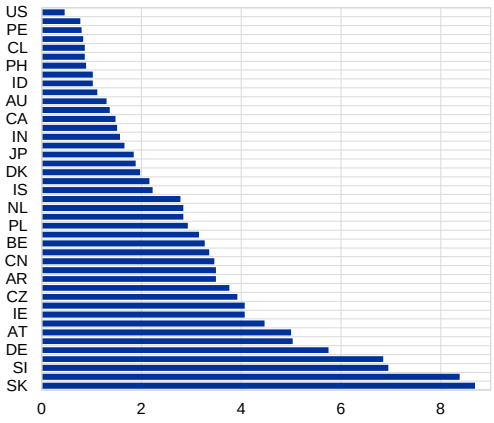
(% of GDP)



Source: Veron, N. & G.B. Wolff (2015): Capital Markets Union: a vision for the long term (No. 878). Bruegel, April 2015. Note: All data refer to end 2014 except EU: equity market (end-2012), Corporate and government debt securities (end-2013) and Japan: Banking sector assets (end 2013).

Chart A.2
Bank bias in Europe

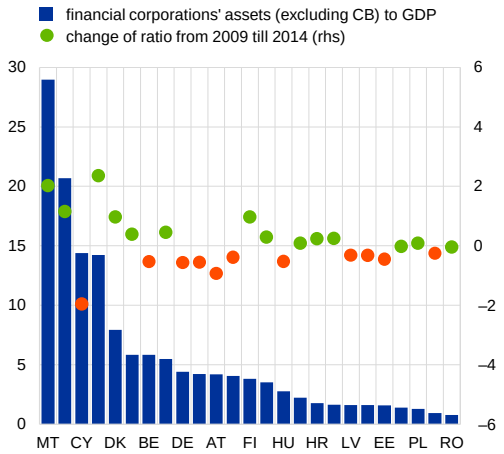
degree of bank bias in 2011
(bank assets divided by stock and bond market cap)



Source: Langfield, S. & M. Pagano (2014): Bank bias in Europe: effects on systemic risk and growth, December 2014. Note: "Bank bias" is defined as the ratio of total bank assets to stock and bond market capitalisation.

Chart A.3
Financial corporations' assets to GDP

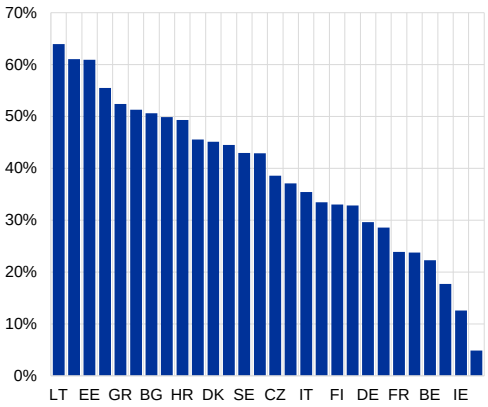
(ratio and its change)



Source: Eurostat and ESRB LIR TF WS5 calculations.

Chart A.4
Loans to private sector as a share of MFIs' assets

(percentage)

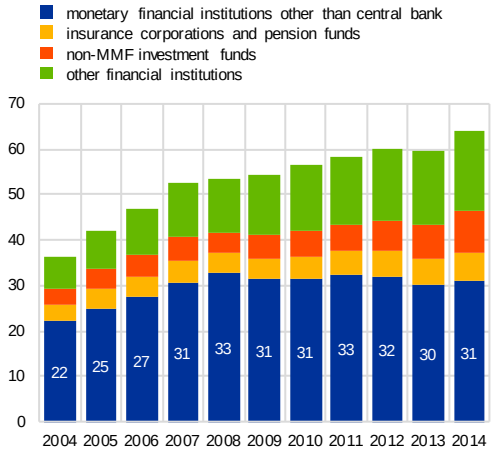


Source: ECB. Data as of May and June 2016.

Chart A.5.

Assets of selected euro area financial sectors

(EUR trillion)

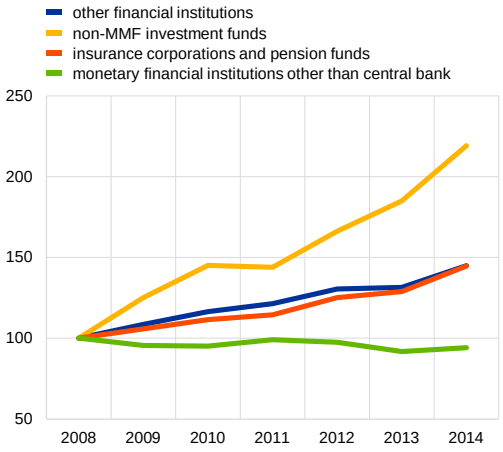


Source: Eurostat. France is excluded due to lack of data.

Chart A.6.

Assets of selected euro area financial sectors

(index: 2008 = 100)

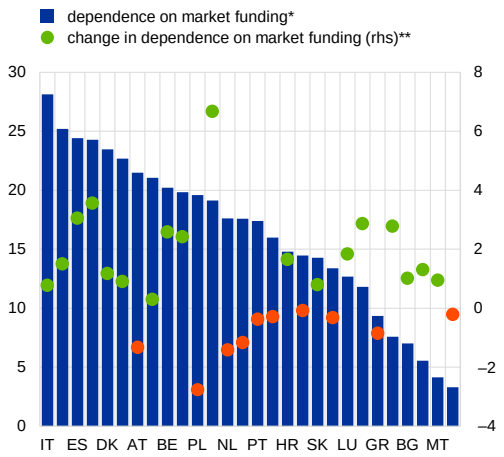


Source: Eurostat and ESRB.

Chart A.7

Dependence on market-based funding (ration and its changes)

(y-axis: percentages (lhs), percentages points (rhs))

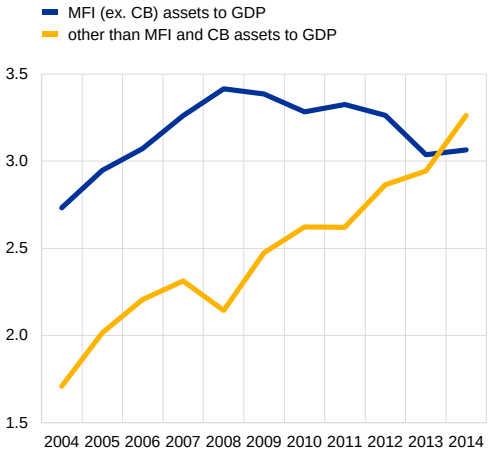


Source: Eurostat and ESRB. * Share of debt securities and listed shares in total financial liabilities of economy
** from 2012 to 2015.

Chart A.8

Growth in the shadow banking sector almost unaffected by the crisis

(assets to GDP, 2004-2014)

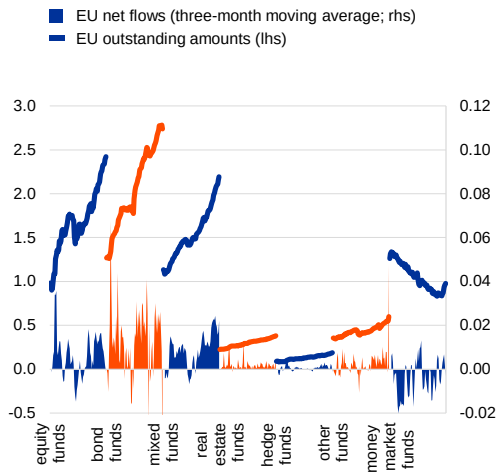


Source: Eurostat and ESRB.

Chart A.9

EU investment funds: assets under management and net inflows

(EUR trillion)

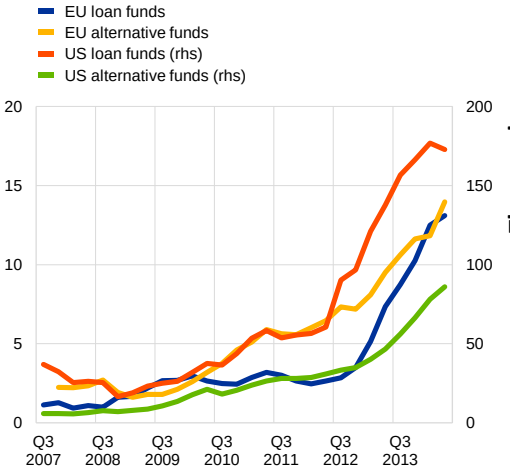


Source: ESRB, ATC 2015-05. ECB, from ESRB 2015 Annual Report.
Note: this chart in based on available EU data and does not include Bulgaria, Croatia, Denmark, Sweden and the UK.

Chart A.10

Total assets of loan participation funds

(EUR billion)

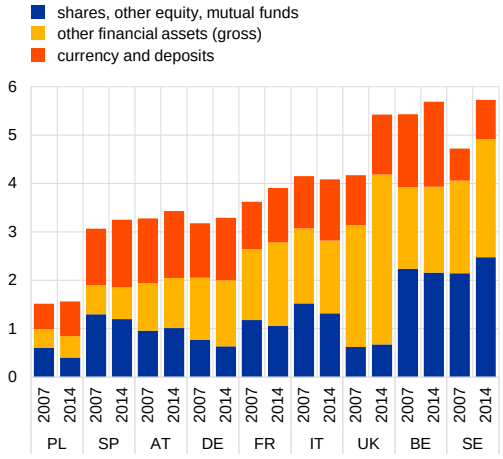


Source: ESMA (2015). Report on Trends, Risks and Vulnerabilities, No. 1, 2015.

Chart A.11

Financial wealth of households and non-profit institutions

(ratio of annual household consumption)

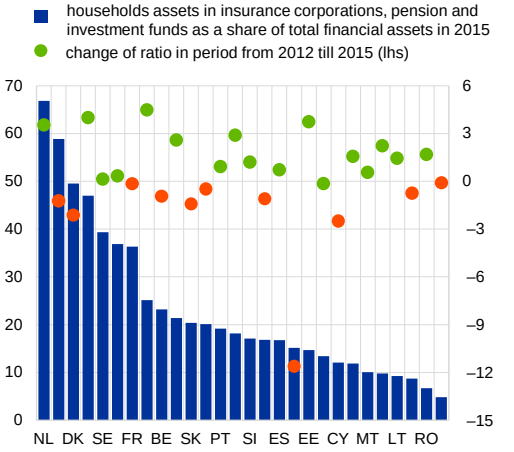


Source: ECB and ESRB.

Chart A.12

Households' and non-profit institutions' serving households assets in insurance corporations, pension funds and investment funds

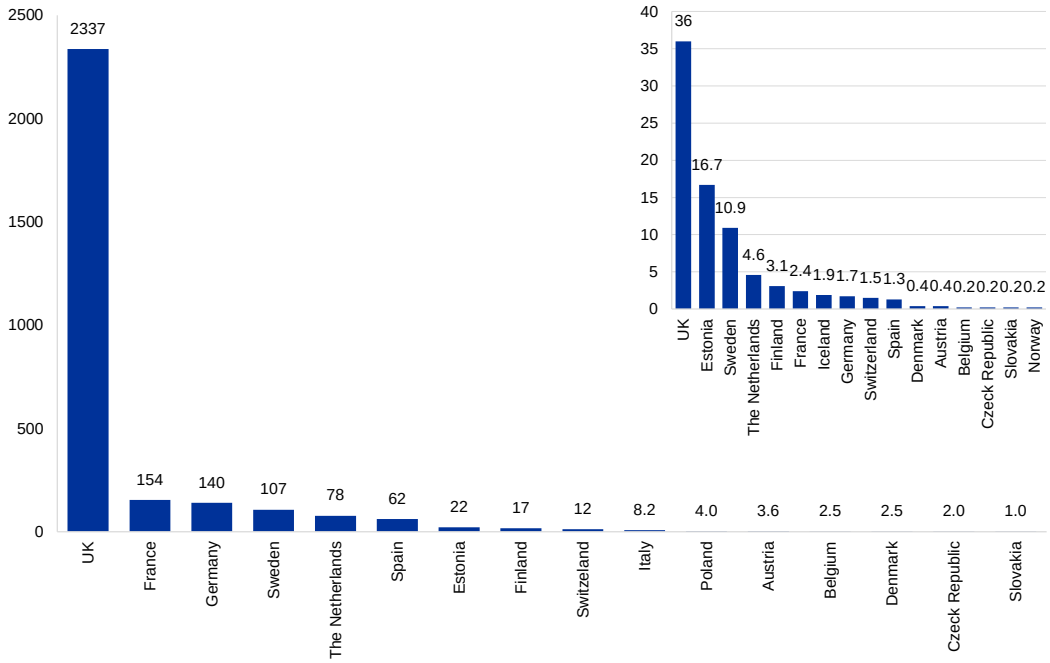
(share of total financial assets and its change;
y-axis: percentages (lhs), percentage points (rhs))



Source: Eurostat and ESRB.

Chart 13

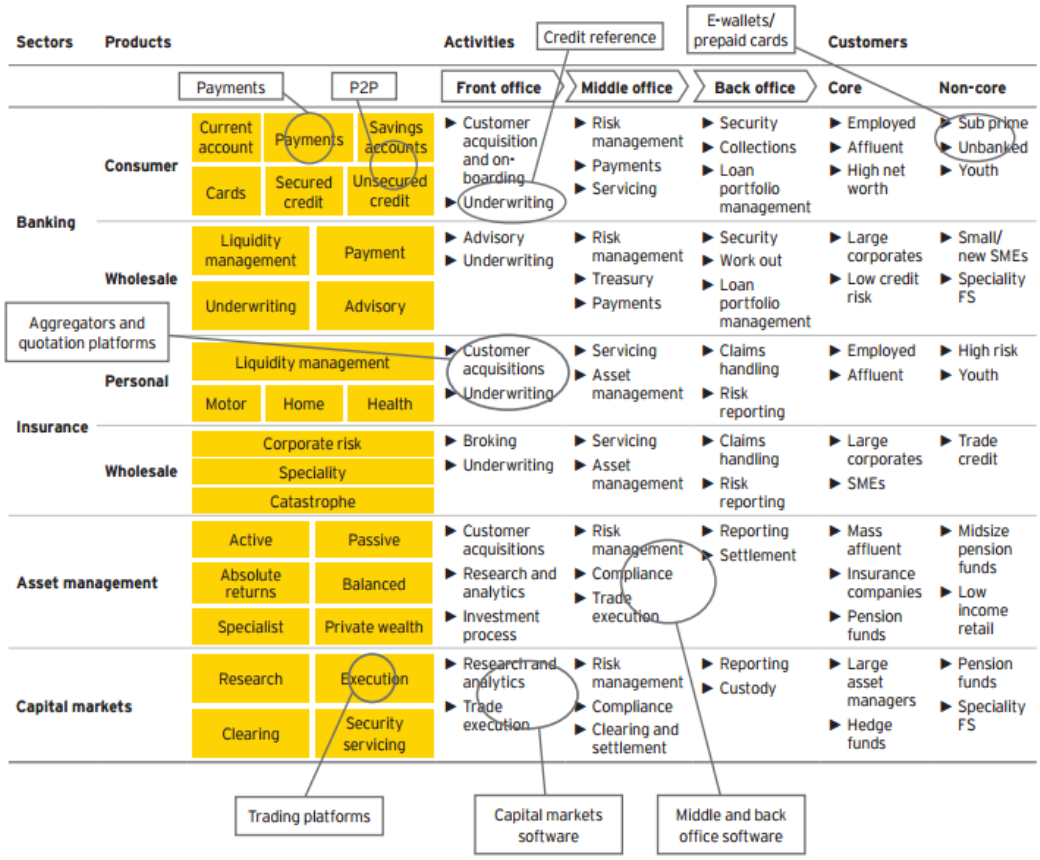
Comparative volume of alternative finance transactions in 2014



Alternative finance includes peer-to-peer (P2P) consumer and business lending; reward-based, equity-based and donation-based crowdfunding, community shares/microfinancing, invoice trading and debt-based securities.
Source: University of Cambridge (2015)

Chart 14

Illustration for new financial technology firms ("Fintechs") in financial services landscape

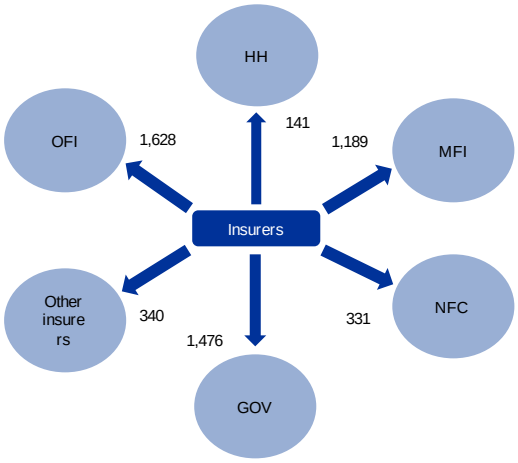


Source: Ernst & Young (2014).

Chart A.15

Insurers' assets exposure to other sectors

(EUR billion)

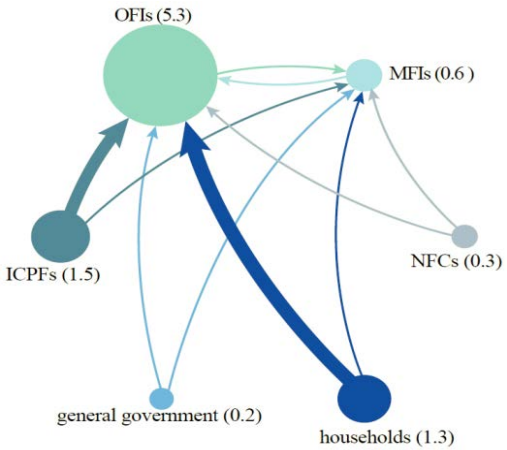


Source: ESRB, ATC 2015-05. ECB Economic Bulletin, February 2015 and ECB calculations. Note: Nodes stand for one euro area sector (MFI: monetary financial institutions, OFI: other financial institutions, ICPF: insurance corporations & pension funds, NFC: non-financial corporations, Households: households & non-profit institutions serving households). Arrows show the holdings by a sector of fund shares issued by another euro area sector (thickness proportional to holdings). Node size is proportional to the sum (in brackets, EUR trillion) of (i) the market value of holdings by the respective sector of fund shares issued by euro area residents and (ii) the value of fund shares issued by the respective sector and held by euro area investors.

Chart A.16

Investment fund shares: Interconnectedness of euro area sectors

(EUR trillion)

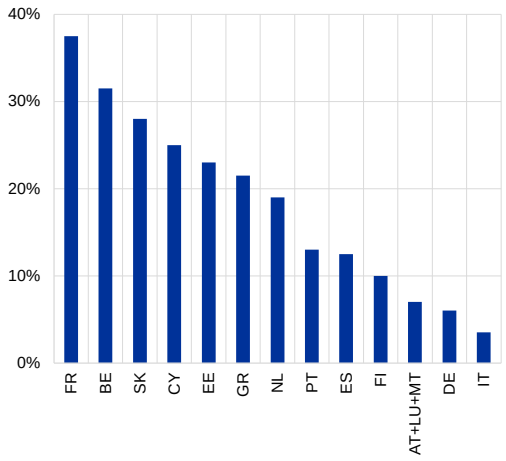


Source: ESRB, ATC 2015-05. ECB Economic Bulletin, February 2015 and ECB calculations. Note: Nodes stand for one euro area sector (MFI: monetary financial institutions, OFI: other financial institutions, ICPF: insurance corporations & pension funds, NFC: non-financial corporations, Households: households & non-profit institutions serving households). Arrows show the holdings by a sector of fund shares issued by another euro area sector (thickness proportional to holdings). Node size is proportional to the sum (in brackets, EUR trillion) of (i) the market value of holdings by the respective sector of fund shares issued by euro area residents and (ii) the value of fund shares issued by the respective sector and held by euro area investors.

Chart A.17

Insurers' market share in MFI funding via debt and shares

(percentage)

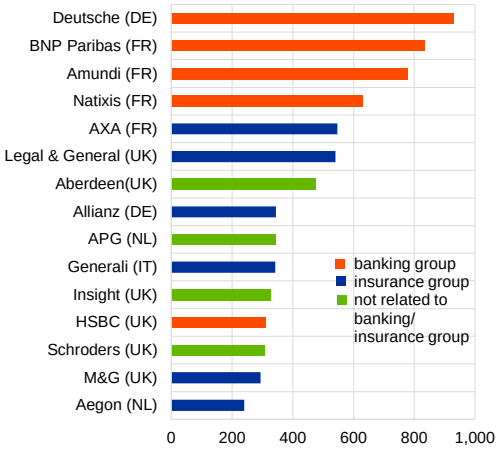


Source: ESRB, ATC 2015-08. ESRB Insurance Expert Group, Final Report on systemic risks in the EU insurance sector, Annex 2 "Interconnectedness of the European insurance sector", Chart 6, page 5, as based on ECB database on securities holdings.
Note: The chart shows % of MFI debt and shares held by insurers.

Chart A.18

Institutional interlinkages: affiliation of European asset managers to banks and insurances

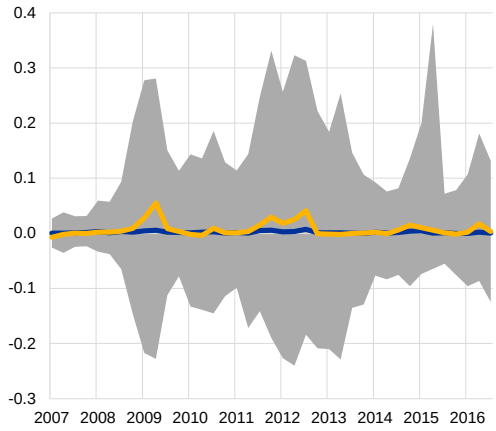
(EUR billion)



Source: ESRB, ATC 2015-05, based on IPE Research.
Note: Assets under management as of end-2014. Data cover asset managers headquartered in the EU. Asset managers forming part of business groups with dominant activities in banking/insurance are reported as affiliated.

Chart A.19

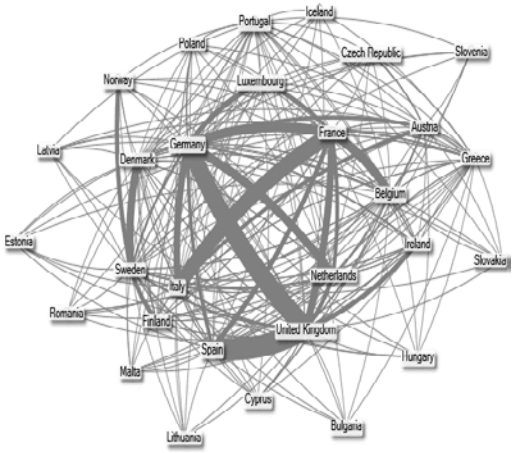
Estimated distribution of spillover potential between individual shadow banks and banks



Source: ESRB, ATC 2015-05. Groß, M., C. Pancaro, D. Zochowski (2015): Assessing cross-sectoral spillover potential among banks, shadow banks and insurance companies, ECB (mimeo).
Note: The estimates show a nonparametric variant of delta-Conditional Expected Shortfall (dCoES). The analysis is carried out using a database of probabilities of default (PD) at daily frequency for a significant sample of about 2,000 financial institutions, from 20 EU countries, covering the period Jan 2007 to Feb 2015. dCoES in PD percentage points; yellow dashed line: market value of assets-based aggregate; black line: median; green: distribution based on the individual dCoES estimates for all pairs of institutions underlying the aggregate.

Chart A.20

Interconnectedness via loans of selected EU banks at end-2014

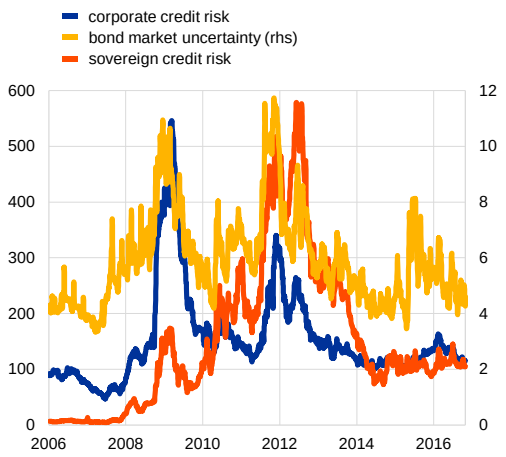


Source: Bank for International Settlements (BIS).
Note: The thickness of lines represents the value of claims.

Chart A.22

Selected indicators of risk premia

(basis points (lhs) and % (rhs))

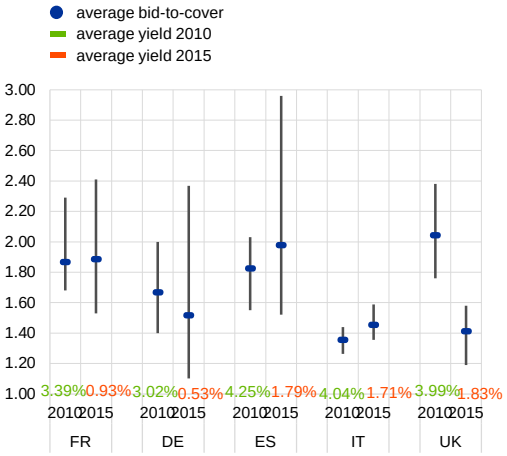


Source: ESRB Risk Presentation, GB 2015-09, based on Reuters data and ECB calculations. Note: Liquidity premium is measured as zero-coupon spreads between German agency (KfW) and government yields. The methodology is based on Ejsing/Grothe/Grothe (2015, Journal of Empirical Finance). Corporate credit risk is measured as spread between BBB- and AA-rated euro area corporate bonds. Sovereign credit risk is measured as average sovereign CDS of Italy and Spain. Bond market uncertainty is measured as implied euro area bond market volatility. Latest observation: 14 September 2015.

Chart A.23

Strong demand at primary market auctions in sovereign bond markets

(ratios and % p.a.)

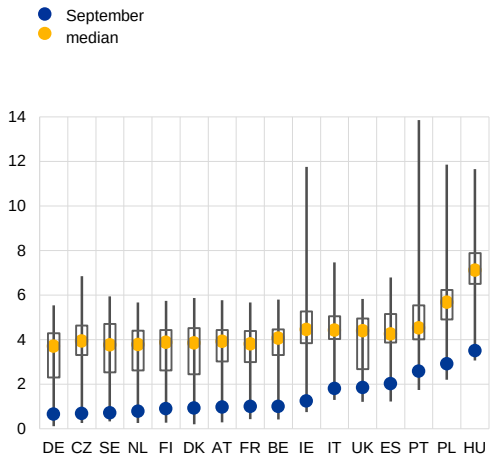


Source: ESRB, ATC 2015-08. Bloomberg and ESRB Secretariat calculations. Note: The lines show the range of bid-to-cover ratios of primary auctions for sovereign bonds during the first half of 2010 and the first half of 2015. The marker refers to the average bid-to-cover for all auctions in a given period. Average allotted primary market yield reported in the bottom of the chart (green for 2010 and red for 2015).

Chart A.24

10-year sovereign yields

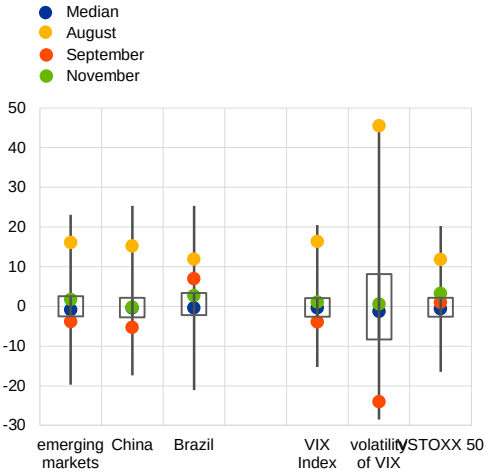
(% p.a.)



Source: Bloomberg and ESRB Secretariat calculations.
Note: The chart shows median, min-max range (vertical lines), 25-75% quartile range (box) of selected sovereign yields Jan 2000-Jul 2015.

Chart A.25

Spillovers of risks via market channels during China crash in Aug 2015

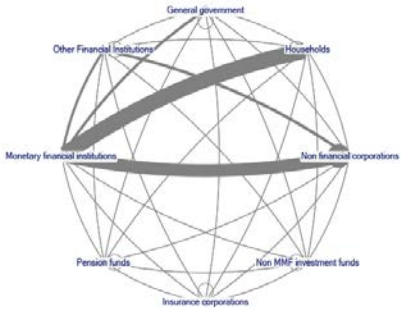


Source: ESRB Risk Presentation, GB 2015-09, based on Bloomberg data and ESRB Secretariat's calculations. Note: Lines refer to the highest and lowest monthly index (change for the right-hand chart) in the data range, box describes first and third quantiles of monthly index change for the period from 1 January 2000 to 14 September 2015.Emerging markets refer to CBOE Emerging markets volatility index (VXEEM Index), China refers to CBOE China ETF volatility index (VXFXI Index), Brazil refers to CBOE Brazil ETF volatility index (VXEWZ Index), Volatility of VIX refers to VVIX index, VSTOXX 50 refers to Eurostoxx 50 volatility index (V2X Index).

Chart A.26

Interconnectedness of economic agents in terms of loans

(Q1, 2015)



Source: Eurostat.

Chart A.27

Changes in loan exposures between Q1 2013 and Q1 2016

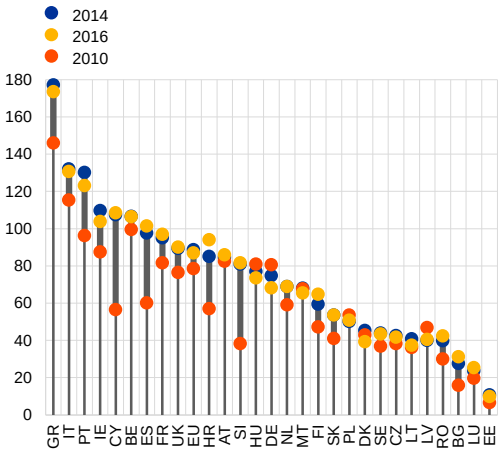
EUR million		Liabilities: Non-financial corporations	Non MMF investment funds	Insurance corporations	Pension funds	Other financial Institutions	General government	Households and NPISH
Assets	Non-financial corporations	122.1	0.3	1.2	1.4	42.7	8.3	3.2
	Monetary financial institutions	–169.4	8.7	18.3	2.2	–167.1	–21.7	89
	Non MMF investment funds	9.1	2.9	0	0.1	15.3	1.8	14.1
	Insurance corporations	12.6	0.1	–1.3	0.7	4.7	4.2	14.7
	Pension funds	0.4	0.1	–1.8	0	4.1	0.1	-0.4
	Other Financial Institutions	190.2	–1.0	1.1	1.4	151	46.8	-60.2
	General government	15.6	0.8	0.7	-0.1	–15.2	124	5.8
	Households and NPISH	–1.9	0.1	3.2	0	2.3	0	1

Source: ECB and ESRB. Red denotes largest declines, orange largest increases.

Chart A.28

General government debt-to-GDP ratio

(% GDP)

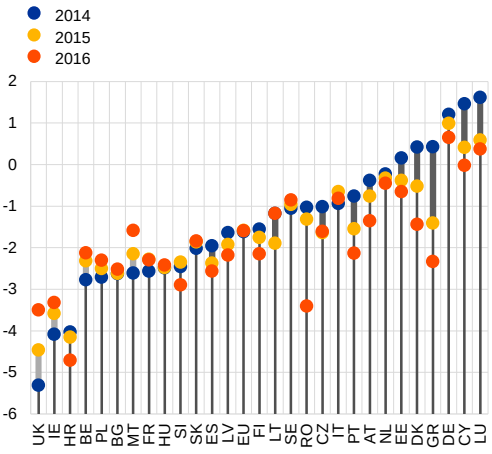


Source: ESRB, ATC 2015-08, based on European Commission Ameco database and ESRB Secretariat's calculations.
Note: Data for 2016 refer to European Commission's forecast

Chart A.29

Structural balance of general government

(% GDP)

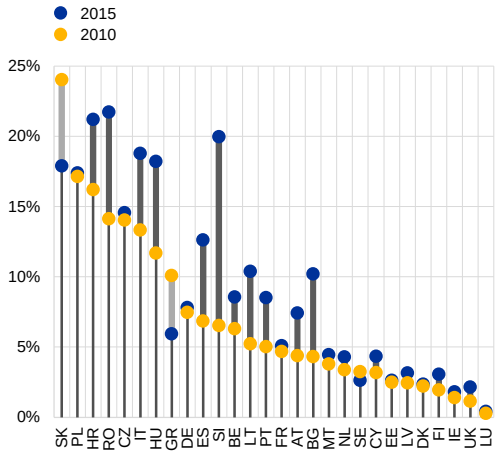


Source: ESRB, ATC 2015-08, based on European Commission Ameco database and ESRB Secretariat's calculations.
Note: Data for 2015 and 2016 refer to European Commission's forecast.

Chart A.30

Bank holdings of domestic government debt

(% of total assets)

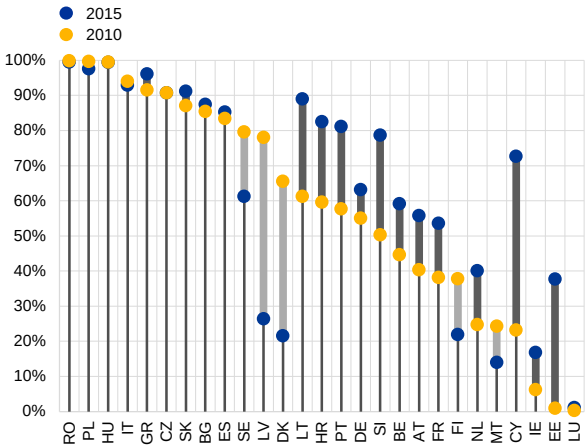


Source: ESRB, ATC 2015-08, based on ECB Balance Sheet Items statistics and ESRB Secretariat's calculations.
Note: End-of-month liabilities for June 2015 and June 2010 (i.e. five years ago). Red columns denote an increase in exposures, green columns denote a decrease. Exposures refer to aggregate of government debt securities and loans (both, central and local government). 2015 data for Croatia refer to May 2015. 2010 data for Latvia refer to Sep 2010. 2010 data for Croatia refer to Dec 2011.

Chart A.31

Bank holdings of domestic government debt

(% of all sovereign holdings)



Source: ESRB, ATC 2015-08, based on ECB Balance Sheet Items statistics and ESRB Secretariat's calculations.
Note: End-of-month liabilities for June 2015 and June 2010 (i.e. five years ago). Red columns denote an increase in exposures, green columns denote a decrease. Exposures refer to aggregate of government debt securities and loans (both, central and local government). 2015 data for Croatia refer to May 2015. 2010 data for Latvia refer to Sep 2010. 2010 data for Croatia refer to Dec 2011. Data on UK non-EU exposures not available.

Chart A.32
Cross-country assessment

		AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK	Median
	Banks																													
1	Banks net interest income / assets	1.7%	1.5%	3.3%	2.7%	2.8%	1.1%	1.1%	2.0%	1.9%	0.6%	1.0%	2.1%	2.8%	3.4%	1.4%	1.4%	1.6%	0.7%	1.8%	2.2%	1.3%	2.3%	1.4%	2.9%	1.0%	2.2%	2.8%	1.0%	2%
2	Banks return on assets	0.6%	0.7%	1.0%	-0.6%	1.1%	0.1%	0.4%	1.1%	0.5%	0.5%	0.4%	-2.8%	-0.9%	-0.1%	0.9%	0.2%	0.9%	0.6%	1.2%	0.9%	0.4%	0.9%	0.1%	1.2%	0.6%	0.4%	0.9%	0.2%	1%
3	Banks cost-to-income	60%	59%	48%	44%	49%	73%	57%	45%	51%	51%	68%	67%	62%	87%	61%	65%	53%	54%	45%	39%	58%	60%	60%	57%	53%	61%	55%	66%	57%
4	Banks coverage ratio	51%	42%	50%	37%	N/A	37%	35%	43%	47%	32%	51%	48%	59%	58%	40%	46%	32%	38%	37%	34%	38%	55%	41%	57%	27%	59%	57%	77%	43%
5	Banks loans-to-deposits	118%	67%	78%	130%	79%	101%	287%	108%	127%	163%	115%	142%	83%	88%	116%	114%	96%	120%	64%	68%	116%	94%	115%	87%	224%	90%	97%	0%	104%
6	Banks percentage of impaired loans	7%	4%	14%	49%	3%	3%	4%	2%	6%	2%	4%	47%	13%	14%	15%	17%	5%	1%	4%	7%	3%	7%	19%	14%	1%	20%	N/A	2%	6%
7	Forebearance ratio for total loans	3%	2%	9%	27%	1%	2%	2%	2%	8%	1%	1%	20%	5%	6%	14%	5%	4%	0%	5%	7%	2%	3%	12%	8%	1%	13%	N/A	2%	4%
8	Tier 1 capital ratio	13%	16%	20%	16%	16%	15%	18%	35%	13%	22%	14%	16%	18%	13%	23%	12%	24%	20%	19%	19%	17%	15%	13%	16%	21%	18%	16%	16%	16%
9	Interbank market dependance	12%	8%	8%	17%	8%	13%	5%	7%	8%	18%	7%	2%	12%	9%	12%	8%	11%	15%	6%	38%	3%	5%	9%	15%	4%	12%	4%	5%	8%
10	Credit-to-GDP gap	-8%	-7%	-21%	-29%	5%	-7%	-33%	-16%	-54%	0%	0%	-12%	N/A	-31%	-46%	-13%	-14%	-74%	-32%	-26%	-20%	-6%	-41%	-9%	-2%	-34%	-4%	-21%	-16%
11	Banks assets as % of GDP	253%	273%	108%	493%	130%	255%	393%	113%	259%	287%	378%	218%	128%	104%	406%	241%	66%	1918%	126%	523%	382%	94%	246%	57%	297%	105%	89%	349%	249%
12	Share of domestic credit institutions (% total assets)	68%	51%	24%	81%	10%	96%	88%	6%	95%	33%	95%	98%	9%	53%	52%	92%	8%	12%	53%	33%	93%	41%	77%	10%	93%	66%	15%	63%	53%
13	Share of the top 5 credit institutions (% total assets)	36%	65%	58%	68%	63%	31%	68%	89%	60%	75%	47%	95%	73%	53%	46%	41%	87%	31%	65%	81%	85%	49%	70%	57%	58%	59%	72%	37%	62%
	Life insurance																													
14	Life insurance as % of household financial assets	12%	15%	1%	4%	6%	17%	27%	2%	7%	9%	34%	2%	4%	5%	14%	13%	2%	13%	1%	10%	7%	5%	12%	1%	9%	8%	7%	9%	7%
15	Life insurance as % of GDP	23%	55%	1%	12%	6%	32%	117%	5%	16%	25%	74%	4%	5%	5%	116%	34%	2%	308%	1%	43%	46%	5%	11%	1%	N/A	9%	17%	97%	16%
16	Insurers' rate of return gap	-0.9	-0.1	-0.6	-0.4	-1.0	0.4	-0.1	0.1	-1.1	-1.4	0.6	-1.6	0.6	0.4	-1.3	-0.6	-1.6	0.0	N/A	1.4	-0.2	0.3	-1.3	-1.2	0.5	-0.7	-0.8	0.1	-0.4
17	Insurers' duration gap	10.1	1.4	3.3	6.2	1.6	10.7	4.7	5.0	0.8	5.4	4.8	2.0	5.9	3.0	-0.6	0.8	10.6	5.5	N/A	7.6	5.4	3.4	1.3	0.8	10.5	8.3	-0.7	-1.1	4.7
18	Approx. share of guaranteed life insurance	N/A	85%	N/A	N/A	57%	90%	67%	39%	90%	28%	77%	56%	100%	38%	11%	73%	35%	24%	74%	59%	28%	37%	98%	46%	N/A	N/A	68%	30%	57%
	Pension funds																													
19	Pension funds as % of household financial assets	6%	7%	8%	8%	7%	14%	22%	12%	8%	8%	N/A	2%	20%	4%	33%	6%	6%	4%	10%	0%	62%	9%	6%	5%	29%	8%	13%	50%	8%
20	Approx. share of defined-benefit pension funds	26%	100%	N/A	N/A	N/A	100%	100%	N/A	1%	100%	N/A	N/A	37%	N/A	56%	6%	N/A	71%	N/A	N/A	99%	N/A	92%	N/A	100%	100%	N/A	81%	92%
21	Approx. share of defined-contribution pension funds	74%	N/A	100%	N/A	N/A	N/A	N/A	N/A	26%	N/A	N/A	100%	63%	N/A	44%	94%	N/A	15%	100%	N/A	1%	100%	8%	100%	N/A	N/A	100%	19%	74%
22	**DB average cover ratios**	100%	130%	100%	N/A	N/A	122%	111%	N/A	102%	118%	N/A	N/A	106%	N/A	99%	N/A	N/A	113%	100%	N/A	109%	100%	106%	134%	143%	109%	100%	97%	106%
23	**Return on asset**	8%	11%	8%	N/A	N/A	5%	14%	N/A	6%	10%	N/A	3%	10%	N/A	16%	6%	N/A	7%	5%	N/A	18%	4%	7%	9%	11%	7%	3%	5%	7%

24	**Penetration rate**	6%	6%	0%	N/A	N/A	7%	2%	N/A	3%	2%	N/A	1%	0%	N/A	48%	7%	N/A	3%	1%	N/A	176%	0%	9%	3%	4%	6%	2%	98%	3%
	Financial markets and financial structure																													
25	**Stock price growth (avg. % p.a. since 2011)**	-5%	5%	3%	-17%	-6%	7%	19%	6%	-4%	4%	1%	-12%	-5%	3%	18%	-5%	5%	-1%	8%	3%	4%	-6%	-8%	3%	3%	-3%	6%	2%	3%
26	**Share of market-based financing in the economy**	15%	18%	5%	1%	9%	24%	27%	5%	14%	29%	24%	9%	11%	4%	36%	15%	6%	21%	2%	8%	21%	15%	14%	5%	23%	7%	5%	35%	14%
27	**3-month Euribor**	-0.3%	-0.3%	0.1%	-0.3%	0.3%	-0.3%	-0.2%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	0.6%	0.9%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	1.7%	-0.3%	0.6%	-0.5%	-0.3%	-0.3%	0.6%	-0.3%
28	**Share of new real estate floating rate loans to households**	63%	2%	98%	98%	5%	12%	57%	90%	43%	97%	2%	97%	48%	46%	68%	42%	84%	46%	92%	80%	15%	100%	65%	94%	87%	63%	6%	16%	63%
29	**Bank interest rates to household for house purchase**	1.9%	2.1%	5.0%	3.1%	2.3%	1.8%	3.8%	2.3%	2.0%	1.2%	2.0%	N/A	4.8%	5.1%	3.3%	2.3%	1.9%	1.7%	3.1%	N/A	2.7%	4.5%	2.0%	N/A	N/A	2.3%	1.8%	N/A	2.3%
30	**Spreads of interest rates for house purchase over EURIBOR**	2.2%	2.4%	5.5%	3.4%	2.0%	2.1%	4.0%	2.6%	2.3%	1.4%	2.3%	N/A	4.3%	4.2%	3.6%	2.5%	2.2%	2.0%	3.4%	N/A	3.0%	0.8%	2.2%	2.7%	N/A	2.6%	2.1%	3.5%	2.5%
31	**Share of new floating rate loans to households and NFCs**	86%	72%	97%	99%	41%	56%	76%	88%	77%	95%	31%	95%	75%	74%	78%	81%	86%	93%	94%	83%	48%	85%	86%	81%	89%	84%	29%	16%	82%
32	**Current lending rates for loans**	2.3%	2.6%	N/A	4.4%	N/A	3.1%	N/A	2.5%	2.3%	1.6%	2.7%	2.4%	N/A	N/A	3.3%	3.1%	2.4%	1.9%	3.3%	3.8%	3.1%	N/A	2.7%	N/A	N/A	3.0%	3.8%	N/A	2.7%
33	**Average investment-grade yields**	0.7%	1.0%	N/A	N/A	1.3%	0.8%	1.0%	2.2%	0.6%	0.5%	0.9%	N/A	N/A	N/A	0.9%	0.7%	N/A	0.9%	N/A	N/A	0.7%	N/A	N/A	N/A	0.7%	N/A	1.6%	1.1%	0.9%
34	**Average non-investment grade yields**	3.4%	1.0%	N/A	N/A	2.4%	1.1%	2.5%	N/A	1.5%	1.6%	1.2%	N/A	N/A	N/A	1.4%	1.7%	N/A	3.8%	N/A	N/A	1.9%	N/A	1.3%	N/A	1.4%	1.2%	1.6%	1.6%	1.6%
	Indebtedness																													
35	**Sovereign debt to GDP ratio**	87%	109%	30%	109%	40%	71%	40%	10%	101%	64%	97%	176%	86%	77%	80%	135%	40%	22%	38%	65%	65%	52%	129%	38%	42%	84%	52%	88%	68%
36	**Household debt to GDP ratio**	51%	60%	24%	127%	30%	53%	123%	41%	66%	67%	56%	62%	37%	21%	58%	42%	22%	57%	24%	58%	111%	36%	76%	17%	85%	28%	36%	87%	55%
37	**Household debt-to-gross disposable income ratio**	85%	103%	N/A	199%	58%	84%	238%	72%	105%	112%	88%	94%	55%	46%	159%	62%	34%	N/A	45%	N/A	231%	61%	112%	31%	167%	46%	51%	134%	85%
38	**Non-financial corporations debt to GDP ratio**	77%	116%	90%	226%	49%	54%	86%	75%	84%	90%	88%	64%	74%	61%	242%	80%	34%	279%	67%	81%	118%	45%	103%	40%	106%	58%	43%	N/A	80%

Source: Technical Documentation, Section E, Chart A.32 in the Annex, prepared by Workstream 5 of the Joint ATC/ASC/FSC Task Force on "Macroprudential Issues and Structural Change in a Low Interest Rate Environment". Note: For illustrative purposes five countries with the highest (or lowest, depending on the indicator) values are highlighted in each category. The following sources are used: Indicators 1-5: ECB statistics banking indicators for Q4 2015. Indicators 6-7: European Banking Association (EBA), data for Q1 2016. Indicators 8-13: ECB statistics, consolidated banking data for Q4 2015. Indicator 14: ECB Quarterly Sector Accounts. The indicator is computed as the ratio of household total life insurance and annuity entitlements over total financial assets. Indicator 15: EIOPA website for gross technical provisions of life enterprises for 2014 (Table 7 of EU/EEA (re)insurance statistics) and Eurostat National Accounts. Indicator is computed as life insurance liabilities over GDP. Data on gross technical provisions of life enterprises is missing for Italy in Table 7 of EIOPA's EU/EEA (re)insurance statistics, and is therefore based on EIOPA Table 4 breakdown of gross technical provisions in life insurance. Indicators 16-17: EIOPA Insurance stress test report 2014, Table 2: Mismatches in internal rate of return and durations. Positive duration gap indicates a longer maturity of liabilities, as compared to assets. Positive rate of return gap indicates a higher required return to cover the liabilities than the expected return on assets. Indicator 18: EIOPA website, Table 4 of breakdown of gross technical provisions in life insurance. The indicator is computed as the share of gross technical provisions of non-linked life assurance to gross technical provisions of total life assurance. Non-linked life assurance is defined by DIRECTIVE 2002/83/EC. The data for PL is provided by the Polish Financial Supervision Authority, the data for Bulgaria, Cyprus and Slovenia is based on 2013 (2014 not available). Indicator 19: ECB Quarterly Sector Accounts. The ratio of household pension entitlements to total household financial assets, end of Q1 2016. Indicators 20-21: EIOPA website, EU/EEA occupational pensions statistics, Table 3: Relative size of the sector per type or scheme. The remaining pension funds are hybrid schemes. Indicators 22-24: EIOPA statistics. Indicator 25: Bloomberg. Stock price growth is computed as price change in the last five years, presented in annual growth terms. Indicator 26: Share of market-based financing in the economy computed as debt securities and listed shares, as a share of total financial liabilities of the economy. Eurostat data on liabilities, listed shares and debt securities in the non-financial corporations sector, according to European System of accounts (ESA 2010). Indicator 27: 3-month EURIBOR rate,

Reuters. Indicators 28, 31: ECB Risk Assessment Indicators, based on MFI Interest Rates Statistics (MIR). Indicator 29, 30, 32: ECB MFI Interest Rates Statistics (MIR). Indicators 33-34: Bloomberg data for Merrill Lynch Corporate Bonds, investment grades are BBB and above, 1 Apr 2016. Indicator 35: ECB statistics, Government finance (Maastricht debt), Q1 2016 Indicators 36-38: ECB Quarterly Sector Accounts, data available for Q1 2016.

Chart A.33

Overview risk assessment (1/3)

	Low for long					
	Banks	**Insurance companies, pension funds**	**Investment funds**	**Markets**	**Real economy sectors**	**Cross-sectoral / system-wide aspects**
Resilience	Low profitability (mainly as a consequence of decreasing net interest margin) reduces banks' ability to accumulate capital organically via retained earnings and to supply credit.	Risk of failures of life insurers and pension funds (pressure on profitability/solvency, traditional guaranteed-return/defined benefit business model challenged)	Risks arising from increased leverage (search for yield)	Risk of disruptions in market functioning related to falls in value of collateral as result of shocks in risk premia or real estate overvaluation correction (where related instruments are used as collateral)	Risk of NFC failures and household balance sheet weakness (pressure on profitability)	Broad-based pressure on profitability and solvency lowers system resilience and increases risk of failures of unsustainable business models, impacting several sectors at the same time
	Low profitability will raise viability concerns for the weakly capitalised banks and provides an incentive for "gambling for resurrection".	Risk-taking beyond risk bearing capacities (search for yield) Risks arising from expansion of non-traditional non-insurance activities	Risks arising from expansion of less regulated shadow banking activities within conglomerates			Broad-based risk-taking beyond risk bearing capacities (search for yield)
	Risk of persistent weakness of balance sheets which impedes resolving problem assets and potentially further deteriorating asset quality (e.g., increase in NPLs, deterioration of credit standards, misallocation of capital and possible adverse macro-feedback on growth).					Risks related to expansion of shadow banking activities, including: Regulatory arbitrage and associated increase in risk taking Increased leverage and resultant fragility of shadow banking entities Growing importance for the financial system and the real economy,
Credit/ financial cycle	Given subdued growth and low credit demand, widespread credit boom is unlikely, but country-specific build-up of some cyclical imbalances possible.	Increased investment in assets with higher credit risk (search for yield, e.g. infrastructure, real estate) Increased risk taking through shift into bank-like credit products without proper expertise and risk management	Increased investment in assets with higher credit risk (search for yield)	Risk of asset price misalignments, which can lead to an abrupt revaluation in case of an increase in risk premia (risk of revaluation)	Risk related to build-up of imbalances in residential / commercial real estate in some countries	Risks related to inefficient allocation of capital
					Shift of investment risks to households	Income volatility and reduced life-insurance and pension fund benefits increase riskiness of borrowers
					Risk of misallocation of investment due to asset price misalignments	Risks related to systemic effects of imbalances in real estate in some countries

Note: The table is based on the results of the sectoral risk assessment included in the Technical Documentation, Sections A-D, prepared by Workstreams 1-4, respectively. The table only shows risks where policy options should be explored (marked in red) and risks which do not require immediate policy action, but should be monitored (marked in yellow).

Chart A.33

Overview risk assessment (2/3)

	Low for long (cont.)					
	Banks	**Insurance companies, pension funds**	**Investment funds**	**Markets**	**Real economy sectors**	**Cross-sectoral / system-wide aspects**
Funding and liquidity/ maturity transformation	Funding risk due to declining traditional deposit base	Risk of selective redemptions by policy holders generating liquidity risk due to investment in less liquid/ long-term assets(e.g. infrastructure, real estate)	Increased liquidity and redemption risk due to investment in less liquid assets (search for yield, e.g. infrastructure, real estate) and shift into bank-like savings products while preserving easy redemption; redemption risk may be triggered by increase in risk premia, especially for funds used as substitutes for bank deposits (e.g. MMF)	Risk of a drying-up of market liquidity as an amplifying factor for asset price revaluation		Emergence or increase in liquidity risk in non-banking sectors (including shadow banking), accompanied by less diversity (more homogeneous risk-taking) in the financial system and consequently higher likelihood of fire sales.
	Increased reliance on wholesale funding (at the cost of equity) could indirectly increase leverage.	Liquidity risk associated with transfer of investment risk to policyholders, including broader provision of unit linked products, redeemable at short notice Risks from shift into bank-like savings products without adequate expertise and risk management				Materialization of funding and liquidity risks could amplify market shocks, affecting many market participants (sectors) simultaneously
Risk concentration/ Market structure /	Banks with largest profitability tensions may engage in M&A transactions. Higher market concentration leading to risks related to too-big-to-fail problems, though limited by stronger non-bank activity	Stronger market concentration leading to risks related to too-big-to-fail problems	Risks related to increasing size and concentration of investment fund sector			Risks related to reduced system-wide resilience due to lower institutional diversity
Interconnectedness	Risk related to higher interconnectedness through higher funding from insurers and investment funds as well as higher lending (liquidity lines, leverage) to investment funds; byproduct of shift of business to non-bank financial institutions	Risk related to higher interconnectedness through higher lending to banks: byproduct of shift of business to non-bank financial institutions Greater product similarity with investment fund sector due to shift to unit-linked products increases the weight of shared risk factors for these sectors	Risk related to higher interconnectedness through higher funding from banks (liquidity lines, leverage) as well as higher lending to banks; byproduct of shift of business to non-bank financial institutions	Risk of spillovers via higher correlation between asset classes due to similar trading behaviour (related to search for yield, *see dimension resilience and financial cycle above*) Risks from common exposures and interconnections through wholesale funding	Risks related to household consumption being more dependent on financial market developments	Greater importance of risks originating in financial markets (interconnectedness raises via common exposures to correlated assets and via cross-sectoral exposures, including as a result of growth of shadow banking); materialisation of risks can be triggered by asset price revaluation, *see dimension liquidity/markets above*),

Note: The table is based on the results of the sectoral risk assessment included in the Technical Documentation, Sections A-D, prepared by Workstreams 1-4, respectively. The table only shows risks where policy options should be explored (marked in red) and risks which do not require immediate policy action, but should be monitored (marked in yellow).

Chart A.33

Overview risk assessment (3/3)

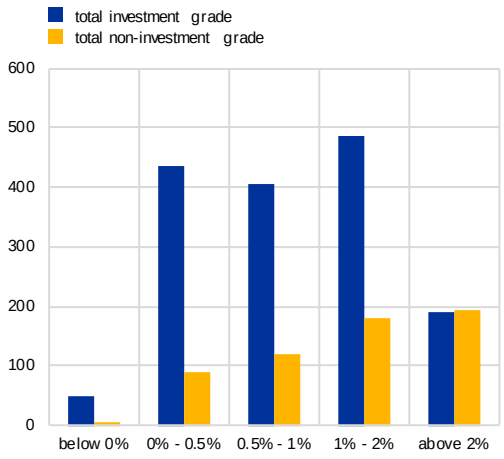
	Back to normal					
	Banks	**Insurance companies, pension funds**	**Investment funds**	**Market**	**Real economy sectors**	**Cross-sectoral / system-wide aspects**
Resilience	Risks related to banking book portfolios originated in the low yield environment, including risk of impaired loans (higher debt servicing costs for floating rate loans, refinancing); interest rate risks in the banking book (where fixed-rate loans dominate). leading to negative NIM		Risks related to to unwinding of activities undertaken in the low yield environment		Risk of balance sheet impairments for non-financial firms and households due to higher debt servicing costs and asset revaluation	Interest rate risk as a macroeconomic risk that can hardly be hedged at a systemic level Correlation of interest rate, credit, and counterparty risk implies feedback loops negatively impacting resilience
Credit/ financial cycle	Risk of lower credit supply due to NPL and forbearance overhang (related to risk of impairments due to increase in rates, *see dimension resilience above*)			Risk of asset re-valuations (induced by gradual increases of interest rates), exacerbated by low market liquidity.		Risk of asset re-valuations leading to synchronised unwinding of activities undertaken in the low yield environment by institutions from multiple sectors negatively impacting stability across the financial system
Funding and liquidity/ maturity transformation	Refinancing risk (e.g., debt securities) due to broad-based deleveraging in other financial sectors		Redemption risk	Risk of a drying-up of market liquidity as an amplifying factor for asset price revaluation		Materialization of funding and liquidity (including redemption) risks could amplify asset revaluations
Risk concentration/ Market structure / Interconnectedness				Risk of high correlation across asset classes especially in declining markets Risk of deleveraging phases when adjusting back to normal		Risk of contagion from shadow banking sector stress due to rising rates to the rest of the financial system

Note: The table is based on the results of the sectoral risk assessment included in the Technical Documentation, Sections A-D, prepared by Workstreams 1-4, respectively. The table only shows risks where policy options should be explored (marked in red) and risks which do not require immediate policy action, but should be monitored (marked in yellow).

Chart A.34.

Number of EU corporate bonds trading at low yields

(number of bonds)

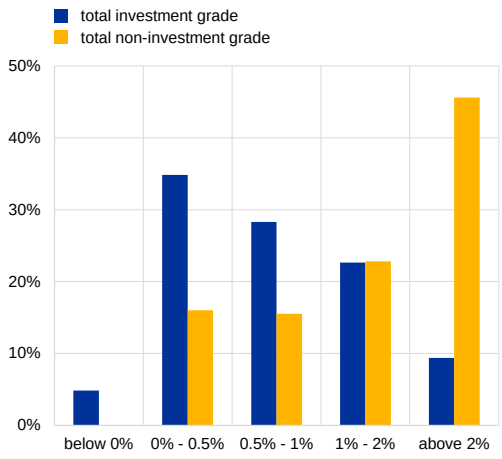


Source: Bloomberg data on bonds included in the Merrill Lynch corporate bond index and ESRB Secretariat's calculations.
Note: See also Technical Documentation, Section E. Includes bonds with maturity above 0.5 year. Non-rated bonds included in non-investment grade. Last observation: 2 March 2016.

Chart A.35

Percentage of EU corporate bonds trading at low yields

(% of bonds per investment / non-investment grade)

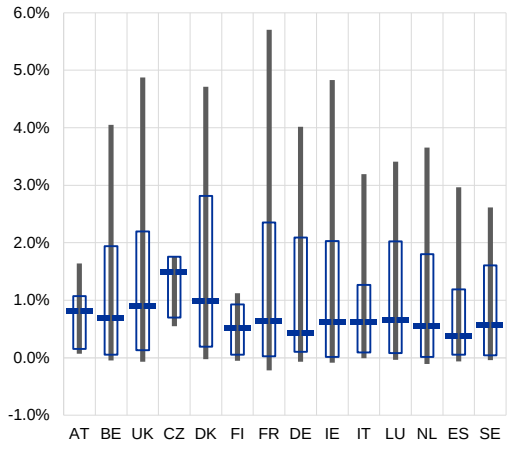


Source: Bloomberg data on bonds included in the Merrill Lynch corporate bond index and ESRB Secretariat's calculations.
Note: See also Technical Documentation, Section E. Includes bonds with maturity above 0.5 year. Non-rated bonds included in non-investment grade. Last observation: 2 March 2016.

Chart A.36.

Yields of EU corporate bonds: investment grade

(percentage)

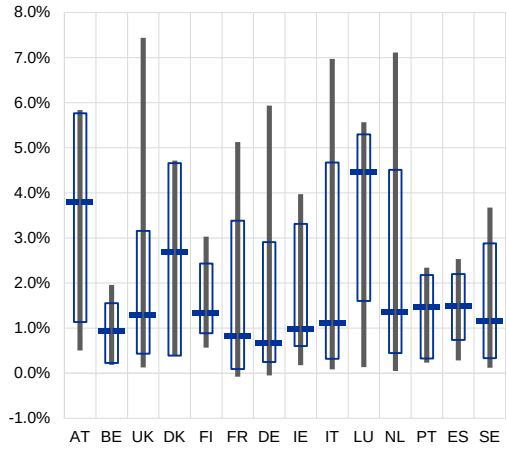


Source: Bloomberg data on bonds included in the Merrill Lynch corporate bond index and ESRB Secretariat's calculations.
Note: See also Technical Documentation, Section E. Includes bonds with maturity above 0.5 year. For all markets shown at least 5 corporate bonds are available. The distributions of yields are shown by lines (min-max range), boxes (10-90 percentiles) and markers for average yield. Non-rated bonds included in non-investment grade. Last observation: 2 March 2016.

Chart A.37

Yields of EU corporate bonds: non-investment grade

(percentage)



Source: Bloomberg data on bonds included in the Merrill Lynch corporate bond index and ESRB Secretariat's calculations.
Note: See also Technical Documentation, Section E. Includes bonds with maturity above 0.5 year. For all markets shown at least 5 corporate bonds are available. The distributions of yields are shown by lines (min-max range), boxes (10-90 percentiles) and markers for average yield. Non-rated bonds included in non-investment grade. Last observation: 2 March 2016.

References

Bindseil, U., Dominick, C. and Zeuner, J. (2015), “Critique of accommodating central bank policies and the ‘expropriation of the saver’”, ECB Occasional Papers, No 161.

Castrén, O. and Rancan, M. (2013), “Macro-Networks, an application to the Euro Area Financial accounts”, ECB Working Papers, No 1510.

Deutsche Bank (2014), Fintech – The digital (r)evolution in the financial sector.

ECB (2015), Economic Bulletin, Who holds what? New information on securities holdings, February.

ECB (2015), The euro area bank lending survey, Q2.

Ejsing, J., Grothe, M. and Grothe, O. (2015), “Liquidity and credit premia in the yields of highly-rated sovereign bonds”, Journal of Empirical Finance, 33 (2015), 160–173.

Ernst & Young (2014), Landscaping UK Fintech.

European Parliament, DG for Internal Policies (2013), Impact of a low interest rate environment, Monetary dialogues February 2013, IP/A/ECON/NT/2013-01.

ESMA (2015), Report on Trends, Risks and Vulnerabilities, No 1.

ESRB (2014), “Is Europe Overbanked?” Report of the Advisory Scientific Committee, No 4, June.

ESRB (2015a), “ESRB Secretariat’s issues note on risks in the EU financial system”, ATC 20 / GB 19, Q2.

ESRB (2015b), “ESRB Secretariat’s issues note on risks in the EU financial system”, ATC 21 / GB 20, Q3.

ESRB (2015c), “ESRB Secretariat’s issues note on risks in the EU financial system”, ATC 22, Q4.

ESRB (2015d), Annual Report 2014, Systemic risks in the financial system of the European Union.

ESRB (2015e), “A mapping and risk metrics framework for the EU shadow banking system”, ASC, Q3.

ESRB Insurance Expert Group (2015), Final Report on systemic risks in the EU insurance sector, Annex 2 “Interconnectedness of the European insurance sector” (B 19).

ESRB Occasional Paper (2015), Network analysis in the insurance sector, No 7, July.

Gartner (2015), “Forecast: Mobile Payment, Worldwide, 2013 Update”, available at http://www.gartner.com/resId=2484915

German Council of Economic Experts (2014/2015), The long road to financial stability in Germany and Europe, Chapter 5 of the Annual Report.

Groß, M., Pancaro, C. and Zochowski, D. (2015), “Assessing cross-sector spillover potential among banks, shadow banks and insurance companies”, ECB, mimeo.

Hellwig, M. (1994), “Liquidity provision, banking, and the allocation of interest rate risk”, European Economic Review, Vol. 38, pp. 1363-1389.

Hellwig, M. and Blum, J. (1995), “The macroeconomic implications of capital adequacy requirements for banks”, European Economic Review, Vol. 39, pp. 739-749.

Langfield, S. and Pagano, M. (2014), “Bank bias in Europe: Effects on systemic risk and growth”, ECB Working Papers, No 1797.

MPAG (2015), MPAG Report on financial stability risks from a low interest rate environment, September.

Sousa, R. (2009), “Wealth effects on consumption. Evidence from the euro area”, ECB Working Papers, No 1050.

University of Cambridge (2015), Moving mainstream. The European alternative finance benchmarking report.

The Economist (2015), The fintech revolution.

Wolff, G. B., and Veron, N. (2015), “Capital Markets Union: a vision for the long term”, No 878, Bruegel.

Members of WS5

The members of WS5 are:

Thilo Liebig
(Chair, Bundesbank)

Magdalena Grothe
(ESRB secretary)

Anne-Lise Bontemps-Chanel
(ACPR)

Robert Düll
(Bundesbank)

Heleen Hofmans
(BoE)

Marion Lajous
(EIOPA)

Petra Lennartsdotter
(Riksbank)

Francisco Mencia Gonzalez
(Banco de España)

Angela Maddaloni
(ECB)

Isabel Schnabel
(Chair, ASC)

Virgilijus Rutikauskas
(LT)

Carmelo Salleo
(ECB)

Jesús Saurina Salas
(Banco de España)

Andreas Staacken
(BaFin)

Mervi Toivanen
(Bank of Finland)

Sebastian Wider
(Bundesbank)

Ianna Yordanova
(DK)

Imprint

Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website **www.esrb.europa.eu**

ISBN 978-92-95081-89-5 (pdf)
DOI 10.2849/625639 (pdf)
EU catalogue No DT-06-16-320-EN-N (pdf)