



EUROPEAN CENTRAL BANK

EUROSYSTEM

FINANCIAL STABILITY REVIEW

JUNE 2012

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CONTENTS

PREFACE	5
I OVERVIEW	7
II THE MACRO-FINANCIAL ENVIRONMENT	15
I MACRO RISKS	15
Box 1 Measuring international financial spillovers	18
Box 2 Extracting fiscal risk signals from sovereign credit default swap spreads	23
2 CREDIT RISKS	27
2.1 Household sector conditions remain heterogeneous across countries	27
2.2 Improved conditions in the corporate sector, but the outlook has deteriorated	30
Box 3 Is disintermediation by euro area corporates with respect to their external financing possible if banks reduce the supply of loans?	33
2.3 Property price misalignments in some countries combined with refinancing risks	36
2.4 Fiscal situation improves, but sustainability concerns remain high	39
III THE FINANCIAL SYSTEM	45
3 FINANCIAL MARKETS AND GLOBAL FINANCIAL INSTITUTIONS	45
3.1 Continuing tensions in money and capital markets	45
Box 4 Assessing stress in interbank money markets and the role of unconventional monetary policy measures	47
Box 5 The impact of the longer-term refinancing operations on money market options	53
3.2 Subdued revenue prospects for global financial institutions	56
4 EURO AREA FINANCIAL INSTITUTIONS	61
4.1 Remaining challenges in the euro area banking sector	61
4.1.1 Financial condition of large and complex banking groups	61
4.1.2 Banking sector outlook and risks	64
Box 6 What does stock lending data tell us about investors' sentiment towards euro area large and complex banking groups?	66
Box 7 Asset encumbrance at euro area large and complex banking groups	75
4.1.3 Assessing the resilience of euro area banks	79
4.2 Generally resilient euro area insurance sector	86
4.2.1 Financial condition of large insurers	86
4.2.2 Insurance sector outlook and risks	88
4.2.3 Assessing the resilience of euro area insurers	92
4.3 Risks stemming from interlinkages of financial institutions remain elevated	94
4.3.1 Interlinkages stemming from banks' operations	95
Box 8 Systemic Risk Measure – A portfolio probabilistic perspective on measuring default risk	99
4.3.2 Interlinkages stemming from cross-sectoral interaction	100

IV SPECIAL FEATURES	105
A EU BANK DELEVERAGING – DRIVING FORCES AND STRATEGIES	105
B LIQUIDITY REGULATION AS A PRUDENTIAL TOOL: A RESEARCH PERSPECTIVE	116
C EVALUATING INTERCONNECTEDNESS IN THE FINANCIAL SYSTEM ON THE BASIS OF ACTUAL AND SIMULATED NETWORKS	125
STATISTICAL ANNEX	SI



PREFACE

Financial stability can be defined as a condition in which the financial system – which comprises financial intermediaries, markets and market infrastructures – is capable of withstanding shocks and the unravelling of financial imbalances. This mitigates the likelihood of disruptions in the financial intermediation process that are severe enough to significantly impair the allocation of savings to profitable investment opportunities. Understood this way, the safeguarding of financial stability requires identifying the main sources of risk and vulnerability. Such sources include inefficiencies in the allocation of financial resources from savers to investors and the mispricing or mismanagement of financial risks. The identification of risks and vulnerabilities is necessary because the monitoring of financial stability must be forward looking: inefficiencies in the allocation of capital or shortcomings in the pricing and management of risk can, if they lay the foundations for vulnerabilities, compromise future financial system stability and therefore economic stability. This Review assesses the stability of the euro area financial system both with regard to the role it plays in facilitating economic processes and with respect to its ability to prevent adverse shocks from having inordinately disruptive impacts.

The purpose of publishing this Review is to promote awareness in the financial industry and among the public at large of issues that are relevant for safeguarding the stability of the euro area financial system. By providing an overview of sources of risk and vulnerability for financial stability, the Review also seeks to play a role in preventing financial crises.

The analysis contained in this Review was prepared with the close involvement of the Financial Stability Committee (FSC). The FSC assists the decision-making bodies of the European Central Bank (ECB) in the fulfilment of the ECB's tasks in the field of financial stability.



I OVERVIEW

The significant financial market turmoil experienced late last year gave way to some respite in the early months of 2012. This relative calm, however, has proven to be fragile and renewed pressures have again emerged since April. Volatility has continued to afflict the euro area financial system – inherent in several market-based indicators, such as bond yields and derivative prices, as well as in other more general measures of market volatility. Recent stress has differed, however, from that witnessed at the end of last year. In particular, concerns now appear to differ across entities depending on specific underlying fundamentals and have moved away from generalised self-fulfilling expectations that threatened an indiscriminate seizing up of liquidity with systemic consequences.

Two distinct avenues of policy action have been pivotal in attenuating financial stability strains within the euro area. On one hand, resolute Eurosystem measures have allayed notions of a funding-related liquidity squeeze for euro area financial institutions. On the other hand, cumulative political action is leading towards a comprehensive strategy to address the ultimate root causes of the euro area crisis. Critical within the latter set of measures has been the approval of several legislative initiatives that include changing the governance of the Stability and Growth Pact and introducing a new macroeconomic imbalances procedure, the approval of the so-called fiscal compact and the enhancement of the size and scope of the euro area's financial firewall to protect Member States. All of these reforms implied progress in policy-setting frameworks at the national level, accompanied by concrete policy measures in several Member States.

Continued turbulence related to specific markets and countries in the first half of 2012 confirms the remaining fragilities in the financial stability outlook. This, in turn, has demonstrated that there is no room for complacency, either on the part of governments or on that of banks. In particular, as described below, Member States should step up their initiatives to strengthen the fiscal and banking components of a robust monetary union.

KEY RISKS TO EURO AREA FINANCIAL STABILITY

Measures of systemic stress have been volatile, signalling some renewed tensions, but have nonetheless remained below their peaks – not least on account of the impact of policy action that averted the materialisation of widespread funding-based systemic stress. At the same time, several core risks identified in the December 2011 Financial Stability Review (FSR), and the interplay between these risks, have remained intact (see the table below).

Continued fragilities since the last FSR...

... notwithstanding two avenues of policy initiatives...

... with several risks still pressing

Three key risks to euro area financial stability

Key risks to euro area financial stability		
	Systemic attributes	Current level and evolution ¹⁾
1. Potential aggravation of the debt crisis for euro area sovereigns	Unwinding of imbalances and contagion	➡
2. Bank profitability risk stemming from weaker economic growth and associated higher credit and asset valuation losses	Aggregate shock	⬆
3. Excessive pace of deleveraging of the banking sector due to frontloaded changes to banks' business models	Unwinding of imbalances	⬇

1) The *colour* indicates the current level (with red representing considerable systemic risk, orange systemic risk and yellow potential systemic risk). The current level of risk is a combination of the probability of materialisation and an estimate of the likely systemic impact of the identified risk, based on the judgement of the ECB's staff. The *arrows* indicate the change since the previous FSR.

Sovereign fragilities remain...

Key risk 1: Potential aggravation of the debt crisis for euro area sovereigns

The first – and arguably most concerning – key risk to euro area financial stability relates to sovereign vulnerabilities at the heart of this stage of the financial crisis, the origins of which lie half a decade in the past. A resurgence in sovereign market tensions within some euro area countries has implied renewed increases in bond yields, along with signs of tension in bond markets. The containment and reversal of such trends rests upon action to address vulnerabilities that persist amongst several sovereigns. It is clear that several euro area countries need to repair both their fiscal positions and prospects, as do other major advanced economies.

... with the interplay of fiscal, economic and financial vulnerabilities

There are several reasons for investors' persistent risk aversion that relate to the main underlying factors influencing fiscal sustainability. First and foremost, reducing both fiscal stock and flow imbalances requires unwavering commitment, and a reactive approach to prevailing market pressure needs to be avoided. Second, a weak growth outlook plagues several euro area countries, along with uncertainty about the rigour of implementation of structural reforms and their effectiveness in terms of raising competitiveness and productivity. Third, uncertainty regarding contingent liabilities related to remaining financial adjustment, as well as uncertainty regarding the robustness of backstops, may reinforce negative feedback loops.

Until such time as these risks to fiscal sustainability have been convincingly addressed – and the associated backstops for the banking sector strengthened – the risk of a potential aggravation of the sovereign debt crisis remains key to euro area financial stability.

Key risk 2: Bank profitability risk stemming from weaker economic growth and associated higher credit and asset valuation losses

Credit risk still abounds in several countries...

Weakened economic prospects can imply increasing vulnerabilities in the non-financial sector, particularly in those jurisdictions in which leverage is high. Systemic risks stem from an adverse impact on the credit risks confronting banks and from possible balance sheet effects, with the most pronounced consequences having the potential to affect those countries with a legacy of property excesses.

... with associated vulnerabilities for banks...

... and a key role for macroeconomic prospects

While specific vulnerabilities faced by euro area financial institutions in the sphere of credit are quite heterogeneous across euro area countries, the main aspects can be broken down into three broad categories. First, a high degree of non-financial private sector leverage in several euro area countries implies fragilities in their debt-servicing capacities, albeit mitigated by the current low interest rate environment. Second, declining property prices in several countries may yet entail a prospective need for eventual further mark-downs on the value of banks' commercial and residential property loan portfolios – notwithstanding the mark-downs that have already taken place – with forbearance a key issue to be monitored in this context. Third, a deterioration of the euro area and/or global economic outlook could not only create asset price volatility, but also more generally weaken both banks' asset quality and borrowers' collateral values, thereby prompting restrictions in credit availability and amplifying the financial and macroeconomic downturn. Such a downturn could be triggered by exogenous factors, such as an oil price shock as a consequence of an escalation of geopolitical tensions or a hard landing of a key emerging market economy. Furthermore, interaction with the sovereign key risk mentioned above is a particular concern: in order to help contain any contractionary impact of the (necessary) aggressive frontloading of fiscal consolidation measures, appropriate policies for economic growth are needed, including, notably, growth-enhancing structural measures in euro area countries.

Key risk 3: Excessive pace of deleveraging of the banking sector due to frontloaded changes to banks' business models

Many euro area banks face a structural need to deleverage and enhance their resilience by improving their capital bases and changing their funding structures. As indicated in this FSR, the cumulative medium-term reduction in leverage within the euro area banking sector could exceed €1 trillion – although it must be acknowledged that there are many uncertainties surrounding estimates of the overall extent of adjustment. Irrespective of the quantitative aspects of such adjustment, in qualitative terms, it represents an integral part of bringing the economy back to a more sustainable post-crisis equilibrium when considered alongside re-optimised business models. Along the path to this new equilibrium, however, there remain risks of a pro-cyclical adjustment that is detrimental to financial stability, risks that require close monitoring.

The funding certainty provided by the wide-ranging liquidity support measures taken by the Eurosystem have significantly attenuated pro-cyclical deleveraging pressures on euro area banks. Funding challenges nonetheless remain in view of the need for fundamental changes to business models. In this respect, central bank actions support, but cannot replace, the necessary steps to be undertaken by banks to create stable funding structures that are suitable for a post-crisis environment. Concrete changes in this regard include closing significant funding gaps (loans minus non-financial private sector deposits), as well as reducing any excessive reliance on volatile funding sources. Liability-side vulnerabilities more generally relate to the role of unsecured funding in the post-crisis liability structure as a consequence of the increased use of secured funding and the resulting higher asset encumbrance. While unsecured funding may not resume the role it played in financing prior to the crisis, secured financing too has clear limitations. In particular, investors' concerns about the increasing subordination of unsecured bank debt, also associated with forthcoming regulatory initiatives on "bail-ins", could place a limit on the rolling-over of unsecured funding.

Throughout the crisis, funding fragilities have plagued euro area financial institutions with intermittent threats of widespread asset "fire sales" or a curtailment of financial intermediation for (and associated lending to) the real economy. Addressing such vulnerabilities would not only reduce perceptions of counterparty risk, but could also support a return to an effective euro area interbank market that is free of segmentation and, at the same time, free of reliance on the provision of extraordinary central bank liquidity.

OTHER RISKS

While many relevant factors are captured by the three key risks to euro area financial stability highlighted above, this list – as holds true for any succinct set of risks – cannot capture all prospective sources of financial instability. Financial stability monitoring is much broader in scope – as is clear from the broad sweep of macro-financial issues covered in this Review – requiring attentiveness to signs of emerging risk that is not yet fully formed, but has a destabilising potential.

In prioritising numerous potential additional risks to euro area financial stability, one of the issues warranting close monitoring, in fact, stems from the broader financial crisis itself. This refers to pricing distortions created by, in particular, the hunt for perceived "safe" assets that has emerged as a result of the crisis on multiple grounds. First, a perceived erosion of the use of sovereign bonds of several countries as risk-free assets by investors may give way to a search for alternative assets that offer a comparable risk-adjusted return – for instance, sovereign holdings of different geographical

Adjustment to a more resilient model continues...

... timely ECB action supports (but does not replace) needed adjustment...

... to eliminate remaining vulnerabilities

Monitoring to detect incipient risks...

... including mispricing in the hunt for (safe) yield...

*... and improved
data to avoid
“unknown
unknowns”*

origin or a complete replacement of sovereign holdings by other assets altogether, such as those in the non-financial corporate sphere. Second, the increased asset encumbrance associated with persistently high perceptions of counterparty risk has led to a dwindling supply of assets that are acceptable in the wide-ranging world of securities financing and repo transactions – activities often considered part of the so-called “shadow banking” sector. While these two examples need not necessarily give rise to systemic risks, any under-pricing of risk as a result of shifting patterns of demand against the background of a limited supply may sow the seeds for the emergence of price bubbles that are subject to sudden and/or unruly unwinding.

Not least with this in mind, initiatives aimed at shedding more light on certain areas of the financial system must be fostered. Progress continues to be made in improving transparency and the capacity for effective monitoring, particularly in areas where detailed or even basic information is currently lacking – as in the case of, in particular, indicators for monitoring non-bank activity. This is vital for financial stability, given the large size of the shadow banking sector in the euro area that, as the ECB has recently estimated, accounts for around half of all banking system assets. This is becoming all the more crucial in an environment where an enhanced regulation of banks cannot be allowed to give rise to a shifting of activities that embed systemic risk to less regulated areas of the financial system. Beyond this, efforts to obtain more information on financial innovation would also be warranted – including details of those developments that have altered market microstructures, such as exchange-traded funds, as well as algorithmic and high-frequency trading.

POLICY INITIATIVES TO ADDRESS THE CRISIS AND STRENGTHEN THE EURO AREA

*Root causes of
the crisis must be
addressed*

While the worst market manifestations of crisis may have passed, there remains a clear need for a continued focus on tackling its root causes. Indeed, a recent resurgence in financial market concerns serves as a timely reminder that market pressure cannot – and should not – be a requisite factor for sustained policy efforts that foster enduring financial stability, which had suffered from deficiencies at both the national and the euro area level.

*The role (and limits)
of ECB support*

Exceptional ECB action has played a crucial role in bringing market stress down from the heights reached at the end of last year. Within the broad toolkit of non-standard monetary policy actions, the three-year longer-term refinancing operations (LTROs) had a clear purpose, namely to prevent a disorderly deleveraging that could have led to a credit crunch. In this sense, a “tail event” involving a collapse in lending activity was prevented. Clear evidence of this is provided by the comparison of the most recent ECB bank lending survey for the first quarter of 2012 with that for the preceding quarter, which indicates a marked fall in credit supply restrictions by banks. More generally, apart from the fact that data on aggregate loan developments do not fully distinguish the loan supply from loan demand, such data must be evaluated against this counterfactual scenario of a credit crunch. And, importantly, it is clear that liquidity should now be more accessible to small and medium-sized enterprises, as evidenced by the several hundreds of smaller banks participating in Eurosystem operations. Aside from this, the operations appear to have had more wide-ranging impacts, including reduced liquidity stress in the interbank market. Ultimately, this action has mitigated liquidity-induced solvency strains in otherwise viable financial entities – while apparently leading to a general reduction of risk aversion in conjunction with lower funding costs for many banks. The ECB’s non-standard measures, which were designed to combat exceptional stress, have not of course left the preferences of banks and investors unaffected, as holds true for any other policy measure. Close monitoring is therefore required to assess the risks associated with any undue strengthening of the links between

financial entities and sovereigns, as well as any undue reliance on central bank funding observed, for instance, in aggregate monetary flows and asset encumbrance.

The three-year LTROs were never meant to be a substitute for other forms of policy action. Exceptional and temporary non-standard central bank monetary policy measures have created breathing space that must be used wisely and effectively. First and foremost, banks must adjust towards viable business models at a reasonable pace in order to maintain the intermediation function for the economy. In the near term, this includes their retaining profits, as well as robust efforts to foster a stronger capital base in order to facilitate their regaining access to market funding. Moreover, prudent risk management needs to be a cornerstone of balance sheet management, and this requires the avoidance of temptations to search for yield on the basis of temporary enhanced public support measures. Second, governments must use the time gained by these LTROs in a decisive manner to enact reforms and lay the political foundations for a stable economic (as well as monetary) union. In this respect, it is useful to recall the fundamental reasons behind this stage of the five-year-old global financial crisis: a deficit bias and a problem of competitiveness that require the problem of real imbalances to be addressed at the euro area level.

Concretely, a proactive (and not reactive) rigorous policy implementation in the five areas presented last year as a comprehensive response to the crisis remains key to decisively ending a spiral of systemic risk augmentation. First, continued action is needed to substantiate commitments at the national level to *both* ensure fiscal discipline *and* accelerate structural reforms for growth and employment. Second, a strong and credible backstop is needed to halt the downward spiral of self-fulfilling dynamics in the pernicious interplay between sovereign, banking and macroeconomic forces – building upon a consolidated fiscal position of the euro area that is strong in comparison with the situation in other developed economies. Third, durable changes to banking models must complement temporary Eurosystem support and provide *lasting* funding certainty, to accompany the strengthening of the capital base of European banks in the first half of 2012. Fourth, continued progress is needed to eliminate political and economic uncertainty not only to stem the forces of contagion but also to provide a more solid basis for markets to manage risk. Fifth, measures to strengthen economic and fiscal surveillance, and to enhance governance, must be taken and not remain contingent on market-driven pressure – thereby providing credible reassurance that the crisis that has engulfed the euro area over the last few years will never be permitted to recur.

While these five areas provide the necessary critical foundations upon which a sustainable monetary union must be based, there is a need to go beyond these areas and conceive a *banking union* as an integral counterpart of *Monetary Union*. Such a banking union would be predicated upon three main objectives. First, strengthening the euro area-wide supervision of the banking sector in order to reinforce financial integration, mitigate macroeconomic imbalances and, therefore, improve the smooth conduct of the single monetary policy. Second, breaking the link between banks and sovereigns – which significantly exacerbates the impact of any financial disturbance – also by establishing a European deposit guarantee scheme and EU-wide crisis resolution arrangements. And, last but not least, minimising the risks for taxpayers through adequate contributions by the financial industry. These reforms will certainly take time to implement and may require substantive legal changes, including in primary legislation.

Breathing space for governments and banks...

... for rigorous implementation of five-point strategy...

... alongside steps towards a banking union as a complement to Monetary Union



REGULATORY INITIATIVES TO BUILD A SAFER GLOBAL AND EUROPEAN FINANCIAL SYSTEM

*Post-crisis
regulatory model...*

Alongside the aforementioned measures that would strengthen the foundations of Monetary Union, numerous supervisory and regulatory initiatives taken in response to the broader financial crisis have been proceeding steadily. This agenda, necessary to strengthen the resilience of the financial sector, consists of many key elements that form a post-crisis architecture, which also fits into the broader context of the ongoing strengthening of the regulatory environment at the global level. Indeed, an international coordination of these endeavours is critical to bolster global financial stability in a world of internationally mobile capital.

*... including
Basel III liquidity
and capital
standards...*

Of the various regulatory initiatives under way, the implementation of the new Basel III capital and liquidity standards must continue to be given high priority – indeed, G20 jurisdictions have been called upon to deliver on their commitment to implement these standards by the end of 2012. To this end, the Basel Committee on Banking Supervision has proposed a three-stage implementation review. In the first stage, countries will carry out a self-assessment of their domestic rule-making processes. In the second stage, the Basel Committee will review the consistency of national rules or regulations with Basel III. Finally, in the third stage, the consistency of the measurement of risk-weighted assets across both banks and jurisdictions will be reviewed. The first review is already under way, covering the EU, the United States and Japan.

*... and their EU
counterpart,
CRD IV*

At the EU level, the transposition of Basel III into EU law through an appropriate directive and a regulation on capital requirements – the new *Capital Requirements Directive* (CRD IV) – has shown the willingness in Europe to implement the newly agreed standards in a timely manner. The ECB's Opinion on this proposal, published in January 2012, expressed support for the establishment of a single European rulebook for all financial institutions, while also providing national authorities with the necessary flexibility to adopt stricter requirements in order to address country-specific financial stability concerns that reflect structural and cyclical differences across domestic financial systems. This includes scope to impose tighter quantitative requirements, while not compromising common definitions for capital ratios and for limits on large exposures, as well as for liquidity and leverage ratios. The European Systemic Risk Board is ideally placed to assume a monitoring and coordinating role in ensuring consistency and in assessing where departures from harmonised regulatory levels give rise to any financial stability concerns, including possible spillovers to other Member States. This will also require an environment of high transparency on the part of all authorities responsible for both macro and micro-prudential supervision.

*Complementary
efforts to identify
systemically
important entities...*

In parallel to Basel III, work has continued on identifying systemically important financial institutions (SIFIs), which is crucial for addressing the negative externalities and moral hazard issues linked to the problem of their being “too big to fail”, a problem that has to be resolved or mitigated. The Financial Stability Board (FSB) has continued to focus on developing a comprehensive policy approach to address the risks associated with SIFIs. In November 2011, specific measures were announced for global systemically important banks (G-SIBs), including a common equity capital surcharge. In the first half of 2012, in line with the G20 mandate, work was under way to appropriately extend this framework to cover other SIFIs, in particular domestic systemically important banks (D-SIBs) as well as other non-bank entities. This agenda needs to see progress in a way that addresses the key role such entities play with respect to financial stability.

*... and to improve
the regulation of the
“shadow banking”
sector*

The regulatory agenda has not been restricted solely to the banking sector. There have also been substantial efforts to prepare policy recommendations addressing the “shadow banking” sector – or activities related to credit intermediation, liquidity and maturity transformation that take place

outside the regulated banking system. Given the breadth and inherent complexity of these activities, this is being concretely addressed by the FSB through five different work streams, while also relying on the support of international standard-setters. Two of these work streams address specific regulatory issues, including the regulatory treatment of money market funds and securitisation. The other work streams assess broader issues, such as the banks' interactions with shadow banking entities, the need for new regulation on shadow banking entities, and systemic risks stemming from practices in securities financing and repo markets.

These initiatives represent only a sub-set of the ambitious and comprehensive regulatory reforms that are under way, albeit an important one. Ultimately, this broad regulatory reform agenda will significantly strengthen the resilience of the international financial sector.

RECENT DEVELOPMENTS

Since the cut-off date for this FSR in mid-May, fragilities in some euro area sovereigns and banks have contributed to continued volatility in financial markets.

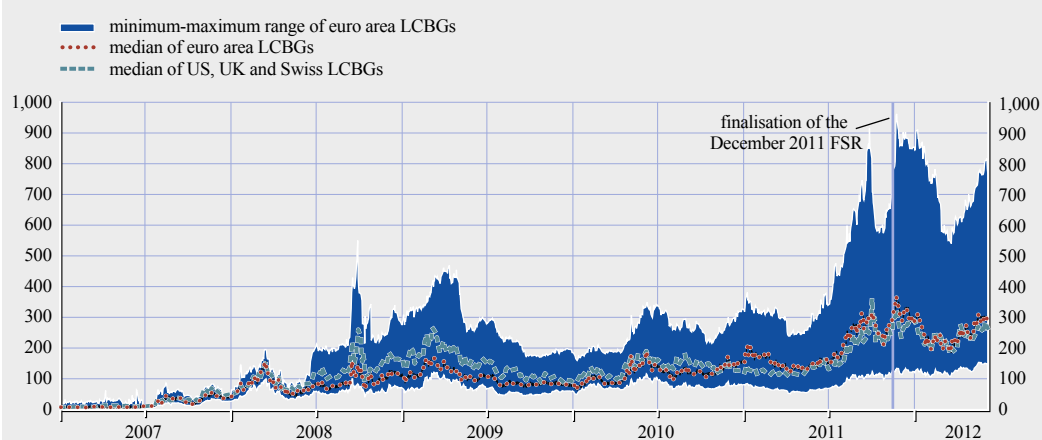
Where *banks* are concerned, the equity prices of euro area financials have exhibited some volatility while generally continuing on the declining path highlighted in this FSR (see Chart 3.17). This development underscores not only strong interlinkages, but also severe headwinds – both macro-financial and regulatory – to be found along the path to more sustainable post-crisis models. This equity market pricing has been mirrored by increasing concern in the derivatives market about the health of large and complex banking groups (LCBGs) – similarly in the euro area and at the global level (see Chart 1). The dynamics of market pricing have reflected the headwinds encountered by banking sector profitability, as revealed in the results for the first quarter of this year – albeit with improved regulatory capital ratios.

Recent developments underscore continued fragilities...

... where banks are concerned...

Chart 1 CDS spreads of euro area and global LCBGs

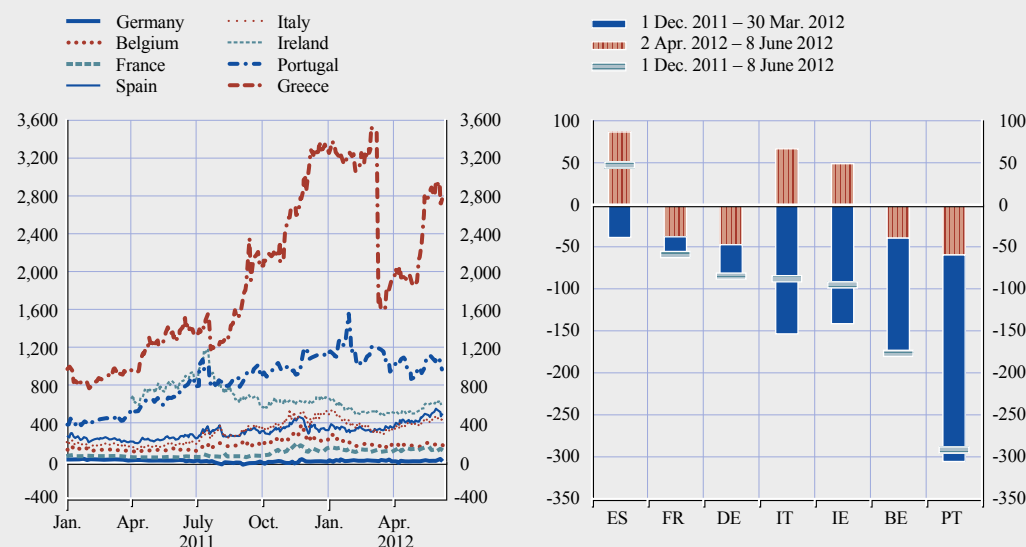
(Jan. 2007 – 8 June 2012; basis points; senior debt; five-year maturity)



Sources: Bloomberg and ECB calculations.

Chart 2 Spread between ten-year euro area sovereign bond yields and the ten-year overnight index swap rate

(Jan. 2011 – 8 June 2012; basis points)



Sources: Bloomberg and ECB calculations.

Note: The euro overnight index swap rate, rather than German government bond yields, was used in order to account for the impact of flight-to-safety flows into German government bonds.

... and where
sovereigns are
concerned

Where euro area *sovereigns* are concerned, bond spreads have continued to be highly volatile, most notably in Greece where political uncertainty has continued to contribute to the observed renewed sharp increase (see Chart 2, left-hand panel). Recent developments in the bond spreads of other euro area countries, however, have been more muted. Indeed, when put in a broader recent historical context, these movements represent only a partial reversal of the marked decline in sovereign risk premia seen at the beginning of the year for most countries (see Chart 2, right-hand panel).

Request by
Spanish
authorities

Turning to specific recent policy developments, the Eurogroup was informed on 9 June that the Spanish authorities will present a formal request for recapitalisation of financial institutions. The financial assistance will cover all possible capital requirements to be estimated by the diagnostic exercise which the Spanish authorities have commissioned to external evaluators and international auditors. The amount of the assistance will cover such capital requirements with an additional safety margin, estimated as summing up to €100 billion in total. This development will make an important contribution to ease existing banking vulnerabilities in the euro area.



II THE MACRO-FINANCIAL ENVIRONMENT

I MACRO RISKS

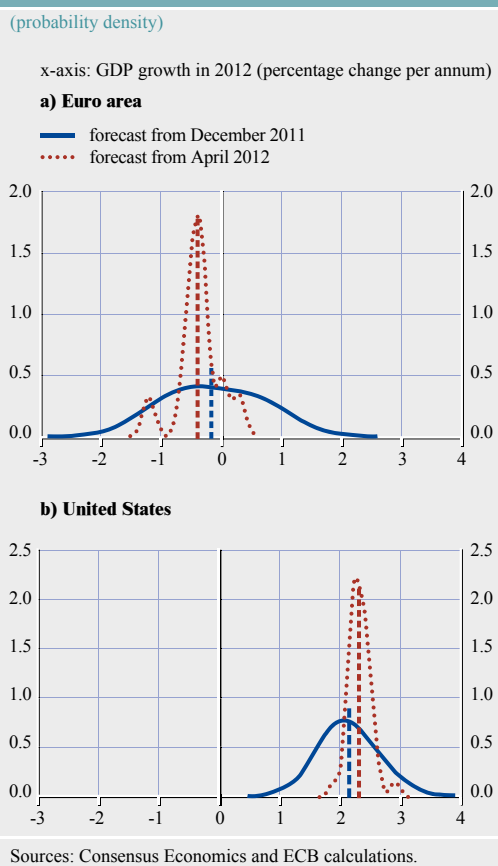
Macro risks remain elevated despite broad incoming signs of a stabilisation in activity at both the euro area and the global level. While the pace of economic expansion is expected to broadly strengthen, the macroeconomic outlook across the globe is surrounded by a high degree of uncertainty. This stems, in particular, from fragilities in several advanced economies, high oil prices and persistent global imbalances.

Incoming data on **euro area** economic activity has suggested a stabilisation, albeit still at a low level. Compared with the outlook at the time of the finalisation of the December 2011 Financial Stability Review (FSR), growth developments in the euro area have been weaker than expected, with a mild contraction in real GDP in the fourth quarter of 2011 being followed by flat growth in the first quarter of 2012 (see Chart S.1.1). More recent survey information for the second quarter points to a weakening of economic activity. At the same time, euro area total unemployment rose to 10.9% in March (see Chart S.1.2) – the highest rate since mid-1997.

A gradual recovery in euro area economic activity is expected for the coming years – supported in particular by foreign demand. The Eurosystem staff macroeconomic projections of June 2012 foresee annual real GDP growth increasing from a range of -0.5% to 0.3% in 2012 to between 0.0% and 2.0% in 2013 – a slight downward revision relative to the December 2011 outlook. While this view is corroborated by private sector forecasts, there is a considerable heterogeneity in views regarding the pace of recovery in the euro area economy, as is the case also for other major global economic areas, such as the United States (see Chart 1.1).

Considerable country-level dispersion continues to persist around the aggregate euro area outlook, with 2012 growth forecasts from Consensus Economics ranging from 0.7% for Germany and Austria to -5.4% for Greece (see Chart 1.2). Since the beginning of 2011, the range of country forecasts has widened significantly – and, worryingly, with a considerable downside skew accompanying the deterioration in the aggregate euro area outlook. Part of the regional divergence within the euro area can be explained by a continued need for several countries to reverse a steady decline in national competitiveness in the pre-crisis period. Clearly, continued structural reforms aimed at repairing and strengthening both price and non-price competitiveness need to remain a key priority in the countries concerned. This would deliver not only a more favourable environment for growth, but also a more sustainable one.

Chart 1.1 Distribution of real GDP growth forecasts for 2012 for the euro area and the United States



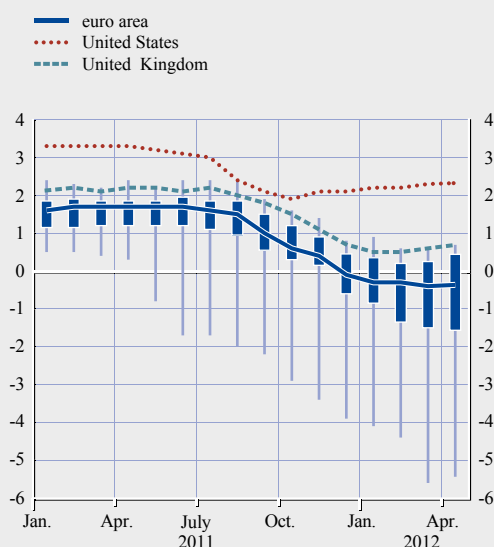
Stabilisation in euro area activity at low levels...

... amid contrasting views on the pace of economic recovery...

... alongside persistent country dispersion

Chart 1.2 Evolution of real GDP growth forecasts for 2012

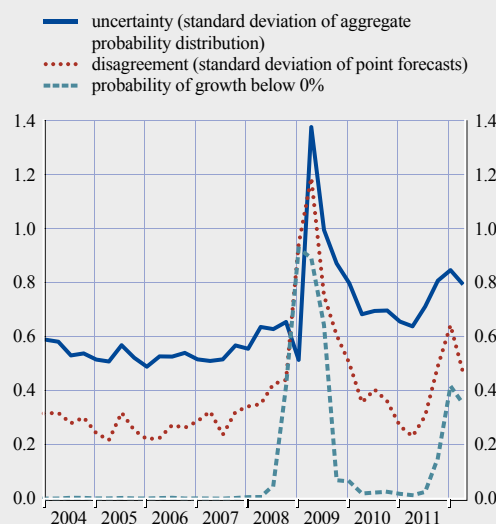
(Jan. 2011 – Apr. 2012; percentage change per annum)



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

Chart 1.3 Uncertainty and heterogeneity surrounding one-year-ahead real GDP forecasts for the euro area

(Q1 2004 – Q2 2012)



Sources: ECB Survey of Professional Forecasters and ECB calculations.
Note: The scale of the downward revision of uncertainty in the first quarter of 2009 resulted in outcomes of probability distributions for one-year-ahead forecasts located mainly in the lowest, open-ended interval; thus, the value for the first quarter of 2009 is an underestimation of uncertainty for that quarter.

Downside risks to the economic outlook...

Risks to the baseline economic outlook for the euro area remain tilted to the downside amid high uncertainty around the growth outlook. In this respect, probability distributions derived from the ECB Survey of Professional Forecasters for one-year-ahead forecasts continue to suggest an increasing heterogeneity of the views of individual forecasters and uncertainty around individual forecasts, and the probability attached to adverse growth scenarios has in general increased since the finalisation of the December 2011 FSR (see Chart 1.3). Three main risks to the outlook for a gradual recovery in economic activity dominate. First, any renewed worsening in sovereign debt markets and the associated impact on credit conditions could adversely impact both fiscal sustainability and economic growth – key factors underpinning the recovery from crisis in these economies. Second, while ECB policies have helped to ease the risk of disorderly deleveraging in the banking sector, remaining pressures could constrain the provision of bank credit and ultimately weigh on household and business activity (see Section 2). Finally, downside risks for the growth outlook also stem from higher commodity prices – a factor analysed in more detail below.

... with associated financial stability risks

This outlook and the uncertainty surrounding it embed several risks to euro area financial stability. In particular, weak economic prospects and uncertainty regarding the duration of the downturn mean that a renewed aggravation of adverse macro-financial feedback loops cannot be excluded. A further slowdown in economic activity would increase credit risks in the euro area non-financial sector and could also lead to a marked increase in the market risks confronting euro area financial institutions through a sharp increase in asset price volatility.

Stabilisation in near-term global economic activity...

Similar to the euro area economy, the **global economy** has also shown continued signs of stabilisation after the finalisation of the December FSR. Notwithstanding this stabilisation, the medium-term

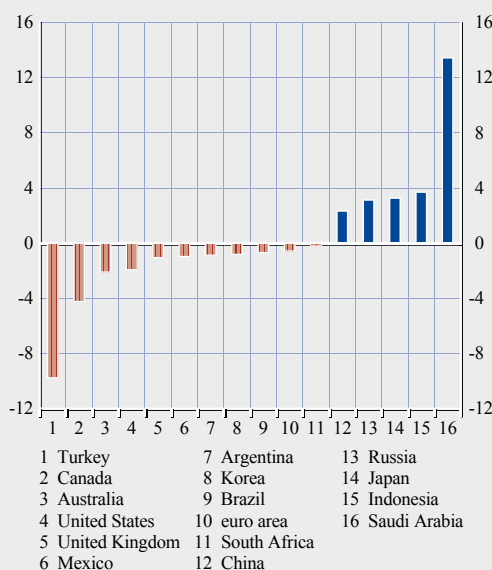
prospects for global activity are expected to remain somewhat subdued. On the one hand, structural impediments in several key advanced economies are expected to continue to restrain the pace of economic expansion. These impediments mainly relate to weaknesses in the labour and housing markets, as well as to the need for further repairs of both public and private sector balance sheets. On the other hand, economic growth in emerging market economies has been moderating on account of weaker domestic and external demand, although it is expected to remain solid overall.

The global outlook remains surrounded by a high degree of uncertainty, albeit with broadly balanced risks to the baseline outlook. Two downside risks to global economic prospects that are relevant for euro area financial stability are particularly noteworthy. First, there are prevailing geopolitical tensions and the associated risk of a disruption to the oil supply and, consequently, higher oil prices. Second, significant challenges remain for many advanced G20 economies with fiscal imbalances.

Beyond these near-term risks, the global economy continues to be confronted by **global real and financial imbalances**. Structural imbalances are still in place; for example, current account imbalances are expected to remain at around 2% of world GDP in 2012-15,¹ which is about twice the average of the 1990s (see Charts S.1.7 and S.1.8). In absolute terms, the United States and China are likely to continue to be the economies with the largest imbalances. According to IMF projections, the US current account deficit would remain in excess of 2% of GDP over the next years, while China's current account surplus is projected to stay close to 5% of GDP – a level well above equilibrium estimates of below 2% of GDP (see Chart 1.4). Putting current account imbalances into the context of estimated country-specific equilibrium positions, the list of noteworthy imbalances expands beyond the largest global debtor and creditor to also include Saudi Arabia and Indonesia as surplus countries, and Australia, Canada and Turkey as deficit countries. The euro area's current account balance as a whole is broadly in line with its estimated norm, by contrast, although fairly marked differences at the national level persist within the euro area. Structural imbalances at the global level, along with heightened investor concerns about the European sovereign debt crisis, have contributed to rising and falling tensions in global financial markets (see Box 1). Indeed, the high degree of uncertainty surrounding global economic conditions was reflected in equity price and bond spread fluctuations, and in capital flow volatility, in emerging market economies (see Chart 1.5).

Chart 1.4 Current account deviations of G20 members from estimated benchmarks

(2011; percentage of GDP)



Sources: IMF and ECB calculations.

Note: Based on M. Bussiere, M. Ca'Zorzi, A. Chudik and A. Dieppe, "Methodological advances in the assessment of equilibrium exchange rates", *ECB Working Paper Series*, No 1151, January 2010.

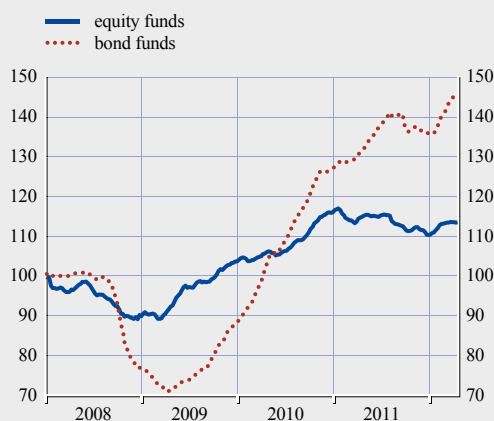
... albeit with
persisting global
imbalances...

¹ Global current account balances may diverge from zero closed-system balances given statistical discrepancies in the recording of global investment and savings (e.g. timing inconsistencies in the reporting of trade and investment income).

... with associated
global exchange
rate misalignments

Chart 1.5 Capital flows to emerging economies

(Jan. 2008 – Apr. 2012; index: Jan. 2008 = 100)



Sources: EPFR and ECB calculations.

Note: Equity and bond flows as a share of total assets under management.

Mirroring current account misalignments, global exchange rate misalignments remain substantial as well, particularly in emerging Asia and in commodity-exporting economies. An exacerbating factor relates to the persistence of inflexible and undervalued currency regimes in some Asian emerging markets, thus hampering a global rebalancing of demand. As a corollary, holdings of foreign exchange reserves by emerging surplus economies remain above any adequacy benchmark, and are projected to rise even further (see Chart S.1.10). Collective policy action to address external and internal imbalances, and on improving exchange rate flexibility, is required in order to avert the likelihood of an abrupt unwinding of global imbalances, which would have negative financial stability implications in terms of market risk and asset price volatility.

Box 1

MEASURING INTERNATIONAL FINANCIAL SPILLOVERS

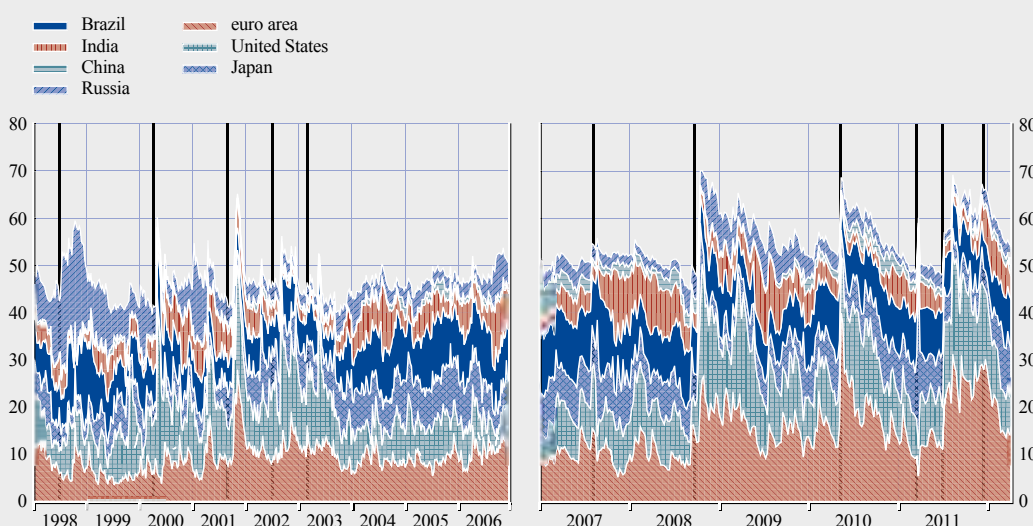
International real and financial linkages, while an integral part of an efficient and well-functioning economic and financial system, also embed an inherent fragility in the form of an international propagation of adverse (in addition to benign) country-specific developments. Given the complexity of financial markets, financial spillovers may take on many forms. Equity markets are an asset class in which financial linkages and prospects for spillovers are strong. Indeed, through highly mobile international capital in this asset class, equity prices are naturally endowed with a high degree of internationalisation. This box uses equity prices to construct a global spillover index for major markets, which is decomposed to show the contribution of each region to global financial market stress.

The computed global spillover index provides empirical evidence that part of the recent decline in financial market stress across the globe was driven by a decline in spillovers from the euro area to the rest of the world.¹ As shown in the chart, the global spillover index can reflect the magnitude, the persistence and the regional origins of a set of systemic risk events since 2007. Significant recent events in this regard include the collapse of Lehman Brothers in September 2008, as well

1 Spillovers are assessed by decomposing the time-varying variance/covariance matrix of the residuals from a cross-country VAR(2) of weekly returns of seven major stock market indices (euro area, United States, Japan, Brazil, Russia, India and China). The time-varying variance/covariance matrix corresponds to the DCC GARCH estimator proposed in R. Engle and K. Sheppard, "Theoretical and Empirical Properties of Dynamic Conditional Correlation Multivariate GARCH", *NBER Working Paper Series*, No 8554, 2001. At each point in time, the ten-week-ahead forecast error variance is decomposed applying the generalised identification method proposed in M.H. Pesaran and Y. Shin, "Generalised Impulse Response Analysis in Multivariate Models", *Economic Letters*, No 58(1), 1998. Bilateral spillovers are calculated following the methodology described in F.X. Diebold and K. Yilmaz, "Better to Give than to Receive: Predictive Directional Measurement of Volatility Spillovers", *International Journal of Forecasting*, 28(1), 2012.

Contributions to global stock market spillovers

(Jan. 1998 – Apr. 2012)



Sources: Thomson Reuters and ECB calculations.

Notes: Each region's contribution to the forecast error variance of the whole system of economies is shown. The vertical lines mark the following set of events: July 1998 – Russian crisis; April 2000 – dot-com bubble bursts; September 2001: 9/11 terrorist attacks; July 2002 – WorldCom bankruptcy; March 2003 – Iraq war begins; August 2007 – Bear Stearns liquidates two hedge funds; August 2008 – Lehman Brothers bankruptcy; May 2010 – EU and IMF agree on €110 billion support package for Greece; March 2011 – earthquake in Japan; August 2011 – euro area sovereign debt crisis intensifies; December 2011 – EU announces fiscal compact and ECB announces the plan to conduct two three-year LTROs.

as European sovereign strains in two distinct phases: first, the strains regarding the sustainability of Greek sovereign debt that erupted in May 2010 and, second, the intensification of the euro area sovereign debt crisis in the summer of 2011 amid expanding sovereign contagion fears. In contrast, the natural disasters that hit Japan in early 2011 made an only transitory contribution to global stock market spillovers.

The persistence of spillovers in the aftermath of the collapse of Lehman Brothers was perhaps the most striking over recent years, with the United States being identified as the main source of risk for global financial markets for several months after this event, as indicated by its sizeable contribution to the global spillover index over the period.

The euro area sovereign debt crisis, by contrast, appears to have had a short-lived spillover impact in early 2010. This contrasted, however, with a much sharper spillover in the second half of 2011. More generally, the results would suggest that over the two years leading up to the end of 2011, developments in the euro area played an ever-increasing role as a driver of global asset market volatility.

More recently, the role of the euro area as a source of shocks has become less important. This is consistent with the view that the policy measures taken by the Eurosystem (most importantly the launching of the three-year longer-term refinancing operations (LTROs)) and by the euro area Heads of State or Government (e.g. the announcement of the fiscal compact) since December 2011 have contributed to mitigating the fallout from the tensions among European sovereigns and banks, thereby dampening outward spillovers to the rest of the world.

Broadening the geographical analysis, the results suggest that the euro area and the United States are overall net “exporters” of financial spillovers, although the extent thereof has abated recently (see the table below). This is not surprising in view of the relatively large size of the US and EU equity markets in comparison with those in emerging markets. From a cross-country perspective, a directional decomposition of the spillover index shows that the euro area and the United States have persistently acted as exporters of financial spillovers since the beginning of the financial crisis in 2007. Conversely, emerging market economies, in particular China, have imported more financial spillovers than they have exported. Finally, the role of Japan in global asset markets is balanced with respect to inward and outward spillovers, with the shock related to the natural disasters of March 2011 the sole exception.

All in all, the results suggest that spillovers can be strong and multi-directional, depending on the nature of region-specific shocks. In recent years, results suggest that the euro area and the United States were predominant sources of spillovers. That said, from a broader financial stability perspective, the prospect of time-varying spillovers – not least given a likely continued increase in equity market capitalisation in emerging market economies – calls for a close monitoring of financial developments in all key economies.

Net financial spillovers

(annual averages)

	2008	2009	2010	2011	2012
Euro area	+	+	+	+	+
USA	+	+	+	+	
Japan		-			
Brazil		-			
India			-	-	
China				-	-
Russia	-		-	-	-

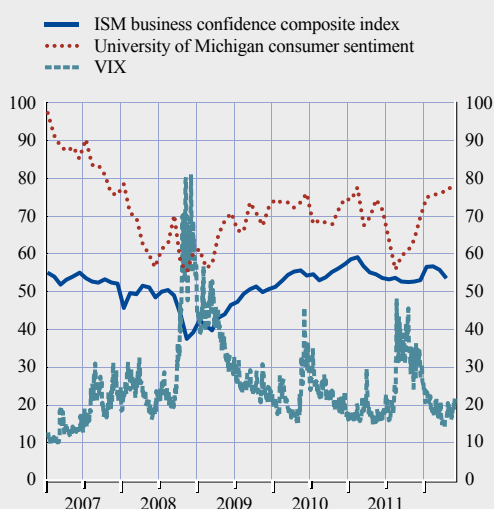
Note: A plus (minus) sign represents net positive outward (inward) spillovers that account for more than 20% of total forecast error variance in the system.

Moving on to the various global economic regions, indications suggest the possibility of a more robust recovery in the **United States** and other advanced economies, albeit with important downside risks. A fall in implied US equity market volatility was accompanied by signs of improving economic activity in the first quarter of 2012 (see Chart 1.9). In particular, sentiment has been bolstered by both strengthening employment growth and improving business confidence indices and retail sales. At the same time, structural impediments to growth caused by housing market adjustment may be unwinding somewhat: the process of deleveraging in the household sector from very high debt-to-income ratios has continued apace, partially also on account of write-downs. Although there might be scope for further deleveraging, the associated headwinds to growth are gradually abating as the household debt service ratio is expected to remain at current low levels in a very low interest rate environment. Overall, the recovery in growth remains modest in comparison with the average recovery following US recessions.

Substantial downside risks to the US outlook remain, associated with the fiscal situation and, increasingly, with higher energy prices. First, based on current legislation, there is a significant degree of fiscal restraint planned for 2013 in order to deal with the currently high fiscal deficit. In particular, if the planned automatic spending cuts are fully implemented, this may adversely affect growth. In addition, the issue of which fiscal policy measures will eventually be adopted to reduce the fiscal deficit is likely to remain contentious before the upcoming presidential elections in November. At the same time, if medium-term fiscal consolidation plans are postponed further, the possibility of a sovereign rating downgrade and subsequent stress in the financial markets may increase. Second, high oil prices continue to weigh on purchasing power in the non-financial private sector of the economy.

Chart 1.6 US business and consumer confidence and the VIX

(Jan. 2007 – May 2012)



Sources: Wall Street Journal, Institute for Supply Management (ISM), Haver Analytics and University of Michigan.
Note: The VIX index measures the volatility implied by the prices of eight S&P 500 index put and call options.

Economic activity in **Japan** was relatively weak at the end of 2011, but is expected to return to moderate growth in 2012, largely supported by public and private reconstruction activities following the tragic natural disasters of 2011. Uncertainty surrounding the outlook, however, remains high. Perhaps the most pressing domestic risk relates to marked fiscal imbalances. While Japan continues to benefit from relatively favourable financing conditions that are linked partly to high domestic Japanese government bond holdings, rising concerns about Japan's fiscal sustainability prospects have been reflected in a substantial increase in credit default swap (CDS) spreads over recent months (see Box 2).

In **European countries outside the euro area**, the business cycle outlook has weakened somewhat further since the December 2011 FSR, despite improved financial conditions. The mild economic contraction in the euro area around the turn of the year had an impact in particular on

those economies in which demand had been driven by external factors. Available forecasts suggest that economic activity in these economies is likely to remain subdued in 2012, before gradually picking up thereafter. Risks surrounding this scenario remain tilted to the downside and notably relate to deleveraging pressures on banking groups active in central and eastern Europe.

Deleveraging pressures in the banking and non-financial sectors are an important contributor to developments and financial stability risks in several European countries outside the euro area, although subdued demand for credit, has also played a role in some countries. In particular, a disorderly and excessive deleveraging process could lead to tighter lending conditions in emerging Europe and constrain the availability of credit, with the potential for adverse feedback to the euro area financial system. Such risks are especially prevalent in countries with remaining macroeconomic imbalances or economic policies that may undermine investor confidence. Despite the recent improvement in financial conditions, concerns about external indebtedness in European countries outside the euro area persist (see Chart 1.7).

Looking specifically at bank subsidiaries in several central and eastern European countries, these entities appear to be facing a gradual withdrawal of funding by their parents, although evidence to date suggests an orderly process of deleveraging as part of the adaptation of bank business models, and some initiatives have been taken that mitigate the risk of a disorderly process (see the special feature on bank deleveraging). Together with the need to adjust macroeconomic imbalances and repair private sector balance sheets, this deleveraging need in the banking sector has contributed to weak or even negative credit flows that were substantially below the unsustainable growth rates recorded in previous years (see Chart 1.8). This, however, does not apply uniformly to all countries: some EU Member States and EU acceding countries in central and eastern Europe that are experiencing subdued credit activity contrast with some countries neighbouring the EU where there are robust capital flows. In the latter case, lending to the private sector continues to expand at a

Some positive signs in Japan, although with a sizeable fiscal imbalance

Varied but generally weak macroeconomic outlook for European countries outside the euro area...

... as concerns about indebtedness remain

Credit developments and deleveraging pressures...

... including foreign
currency loan
mismatches

rapid pace, raising some concerns about credit quality and a need to unwind imbalances at some stage in the future.

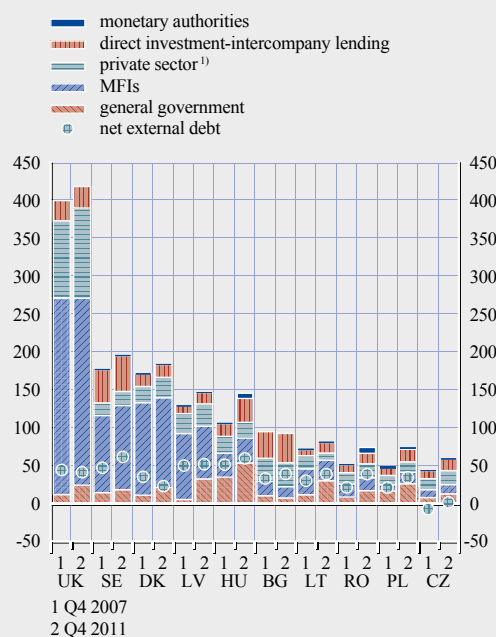
An important factor adding to the vulnerabilities stemming from high indebtedness remains the prevalence of foreign currency loans in several central and eastern European countries, although there are some exceptions such as the Czech Republic. Foreign currency mismatches are among the most important vulnerabilities in the region as, in addition to funding and other risks, they expose unhedged borrowers also to exchange rate risk, and they are very widespread. Moreover, foreign currency loans increase funding and liquidity risks and may hinder the transmission of monetary policy. The potential impact of these risks varies significantly across the region, depending, for example, on the risk of exchange rate depreciation and the amount of outstanding foreign currency loans. The depreciation of currencies in the region can worsen the debt servicing capacity of unhedged domestic borrowers, potentially leading to a significant weakening of both the financial condition of the private sector and euro area banking groups that have exposures to such borrowers. In some countries, such risks have already materialised to some extent. As a result, non-performing loans have increased in these cases and might rise further in the case of further currency depreciation.

Economic
developments
and asset price
imbalances in the
United Kingdom
and Scandinavian
countries

In the **United Kingdom**, the pace of macroeconomic expansion is likely to remain muted. Apart from a possible drag on growth from external factors, growth may be restrained by domestic factors such as falling real incomes, tight credit conditions and subdued household and business confidence. As in other advanced economies, high government borrowing needs and public indebtedness represent an additional risk in that they expose the government to refinancing risks and potential declines in investor confidence. Over and beyond this, household leverage and property prices remain high and susceptible to any correction. This latter factor is not specific to the United Kingdom, but also present in

Chart 1.7 External indebtedness in non-euro area EU countries

(percentage of GDP)



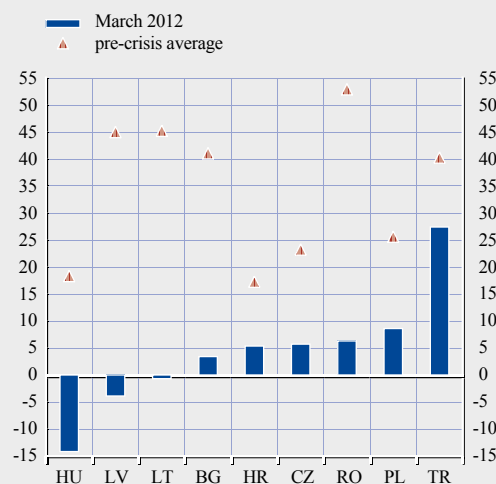
Source: ECB.

Notes: Data for the United Kingdom refer to the second quarter of 2011.

1) Comprises non-financial corporations, households and other non-MFIs.

Chart 1.8 Growth in credit to the private sector in selected European countries outside the euro area

(percentage change per annum)

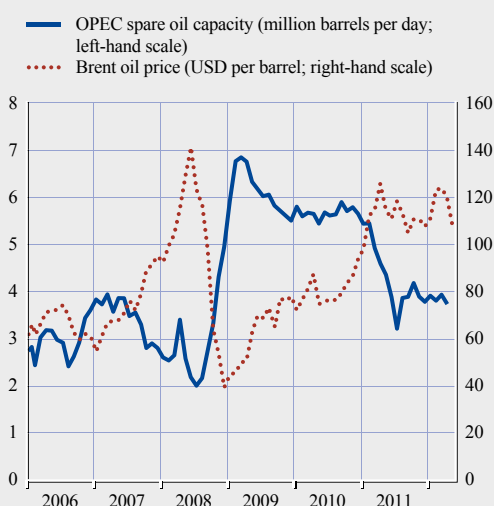


Sources: National central banks and ECB.

Notes: Pre-crisis average for the period January 2005 – December 2008 (data for Romania start in December 2005).

Chart 1.9 Oil prices and spare oil production capacity

(Jan. 2006 – May 2012)



Source: Bloomberg.

other EU countries outside the euro area such as **Sweden** and, to a lesser extent, **Denmark**, where property prices have already fallen significantly. In these countries, households and banks remain vulnerable to potential declines in house prices, particularly if banks have exercised forbearance on their problematic loans thus far.

One factor affecting all global economies is to be found in the high prices in several key **commodity markets** such as the oil market (see Chart 1.9). Although oil prices have declined from the highs seen in March, they remain elevated, which has the potential to adversely impact, in particular, real incomes. This, in turn, is likely to negatively impact global external demand and the growth prospects of euro area economies, especially those reliant on export-led recoveries. From a financial stability viewpoint, rapid unhedged movements in commodity prices are of great

High commodity prices and downside risks to economic activity

concern, not least given the potential to induce a higher incidence of financial stress for affected entities. In this vein, a major source of concern relates to abrupt and disorderly supply disruptions, for instance those related to any escalation of geopolitical tensions. The apparent sensitivity of commodity prices has to be viewed through the prism of existing market tightness: supply disruptions in several oil-exporting countries, as well as still robust global oil demand, have stretched spare production capacity to levels well below those in early 2011 (see Chart 1.9).

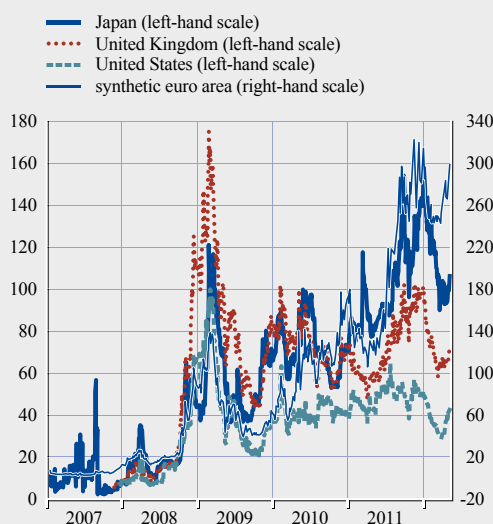
Box 2**EXTRACTING FISCAL RISK SIGNALS FROM SOVEREIGN CREDIT DEFAULT SWAP SPREADS**

Sharp increases in sovereign credit default swap (CDS) spreads have attracted considerable attention during the financial crisis, especially the high CDS spreads of euro area sovereigns under stress. Reflecting the broad-based fiscal deterioration in conjunction with the recent crisis, rising CDS spreads have been observed in advanced economies not only inside but also outside the euro area. Notwithstanding the recent tightening, between October 2010 and January 2012, five-year sovereign CDS spreads nearly tripled in Japan, almost doubled in the United Kingdom and rose marginally in the United States (see Chart A). In contrast to the experience of some countries in the euro area, however, the rise of sovereign CDS spreads in Japan, the United Kingdom and the United States was not accompanied by a simultaneous increase in government bond yields.¹ In these countries, the latter broadly declined, which raises the question of the extent to which rising CDS spreads signal changes in market perceptions regarding country-specific credit risk.

¹ For a discussion on the relationship between CDS spreads and government bond yields, see A. Fontana and M. Scheicher, "An analysis of euro area sovereign CDS and their relation with government bonds", *ECB Working Paper Series*, No 1271, 2010.

Chart A Sovereign CDS spreads

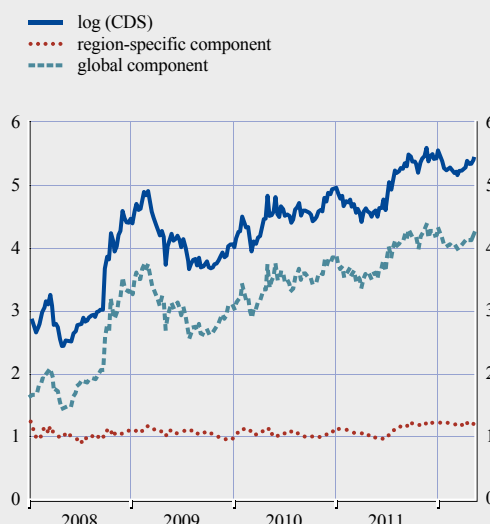
(Jan. 2007 – May 2012; basis points; five-year maturities)



Sources: Thomson Reuters and ECB calculations.
Note: The euro area CDS spread is the GDP-weighted average of nine euro area countries for which data are available from January 2007.

Chart B Decomposition of the euro area sovereign CDS spread

(Jan. 2008 – May 2012; logarithm of CDS spread; five-year maturities)



Sources: Thomson Reuters and ECB calculations.
Note: The euro area CDS series are GDP-weighted averages of the German, Greek, Irish and Spanish CDS spreads and their estimated country-specific and global components.

The literature on sovereign default risk highlights that the dynamics of sovereign CDS spreads may be driven by several determinants, ranging from global factors such as risk aversion, illiquidity or contagion risk to sovereign credit risk.² Therefore, movements in CDS spreads may not necessarily signal changes in country-specific credit risk. In order to isolate a signal that is specific to a country, the log of the CDS spread can be decomposed into a global risk component and an idiosyncratic, or country-specific, component. This decomposition is based on a common factor model using five-year sovereign CDS spread data for Japan, the United States, the United Kingdom, Brazil, Germany, Italy, Ireland and Spain.³

The results suggest a differentiated contribution of global and local factors that depends on the country. For the euro area, it is apparent that the dynamics of the euro area aggregate CDS spread and the global component are closely synchronised (see Chart B). This suggests that at the current juncture, investors relate global risk in part to developments in euro area sovereign CDS markets.

Given that global dynamics can have sizeable effects on a country's CDS spread, the headline spread may bear little relation to investors' perception about the country's fiscal risk. For instance, the decomposition in Chart C shows that the country-specific component of the United Kingdom

2 See, for instance, R. De Santis, "The euro area sovereign debt crisis: safe haven, credit rating agencies, and the spread of the fever from Greece, Ireland and Portugal", *ECB Working Paper Series*, No 1419, 2012.

3 These eight countries account for about one-third of the global CDS market in terms of the gross notional amount outstanding. Greece was excluded from the sample as its sovereign CDS temporarily ceased trading on 9 March, after a credit event had been identified by the International Swaps and Derivatives Association.

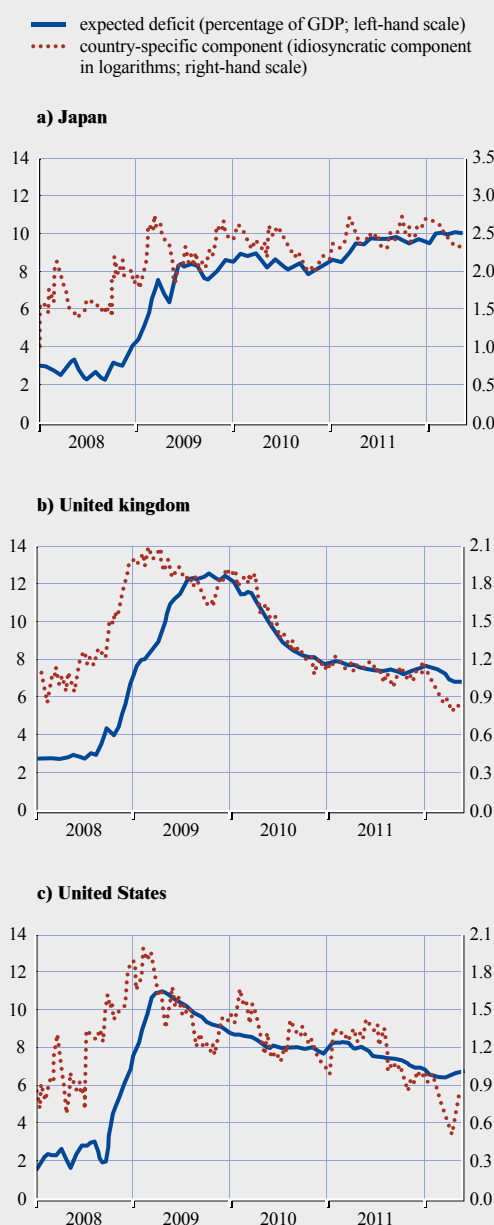
has in fact been declining since 2010, while its sovereign CDS spread has doubled. This indicates that global dynamics were underlying the rise in its sovereign CDS spread. In Japan, by contrast, the idiosyncratic component increased sharply after the Great East Japan Earthquake and largely accounted for the rise in sovereign CDS spreads over the past year.

To the extent that the country-specific CDS components reflect country-specific credit risk, one can assess whether movements in the idiosyncratic components are related to developments in fiscal fundamentals. As Chart C shows, the country-specific CDS component closely tracks the expected one-year-ahead fiscal deficit as derived from the Consensus Economics survey. The close relationship between the two variables indicates the potential of country-specific CDS components to provide a forward-looking fiscal risk signal for these countries. The visual indication is also confirmed by statistical evidence. Linear and non-linear regression approaches show that the expected 12-month-ahead fiscal deficit has a positive and statistically significant relationship with the country-specific CDS component. Moreover, this relationship tends to be stronger when the expected deficit-to-GDP ratio rises above a certain level. With respect to the United States, for example, a threshold regression points to a level value of 2.3%, whereas threshold values of about 3% result in a better fit of the model to the United Kingdom and Japan.

While the deficit explains the low-frequency movements of the country-specific CDS component, its short-term dynamics also react to events with potential implications for public finances. For example, this can be observed for Japan in March 2011, following the earthquake, and in the United States in July 2008, when the US Treasury Secretary requested government funds to support the government-sponsored enterprises Fannie Mae and Freddie Mac.

Chart C Country-specific CDS spread components and the expected fiscal deficits

(Jan. 2008 – May 2012)



Sources: Thomson Reuters, Consensus Economics and ECB calculations.

Notes: The country-specific CDS component has been derived from the logarithm of the respective CDS spreads. The decomposition was implemented with a state space model that relates the observed five-year CDS spreads of Japan, the United States, the United Kingdom, Brazil, Germany, Italy, Ireland and Spain to an unobserved common component and the respective idiosyncratic components, which are estimated with the Kalman filter on the basis of weekly data from December 2007 to May 2012. The results are robust to different country samples. The expected deficit is the expected one-year-ahead fiscal deficit-to-GDP ratio, which is derived from Consensus Economics forecasts.

In conclusion, rising sovereign CDS spreads may reflect different underlying dynamics, depending on whether the increase is driven by changes in global or in country-specific risks. It is important to distinguish between these sources of risk for financial stability analyses as they may entail quite different policy implications. Given that the country-specific component is closely related to expected fiscal fundamentals, the idiosyncratic component may be interpreted as a market-based signal of fiscal risk that can serve as a monitoring tool for financial stability assessments. By partially isolating this indicator from the influence of global risk factors, the idiosyncratic sovereign CDS component can provide a more precise signal about investor sentiment towards a country's medium-term fiscal sustainability than the headline CDS spread. Overall, given the close relationship between the idiosyncratic component and the expected fiscal deficit, the results also underscore the need for fiscal discipline to maintain market confidence in a country's public finances.

2 CREDIT RISKS

The period since the finalisation of the December 2011 issue of the Financial Stability Review (FSR) has seen incoming data suggesting a slight improvement in the fundamentals of both the private and public sectors in the euro area. Notwithstanding this better aggregate development, considerable vulnerabilities remain in several countries and segments.

Looking ahead, challenges to fiscal sustainability are perhaps the most pressing concern in the non-financial sector of several euro area countries. Most importantly, while progress with fiscal consolidation has recently been sizeable in most euro area countries, particularly by international standards, fiscal challenges remain considerable in several cases. Risks in the private sector, although less elevated on average, nonetheless persist and are marked by significant cross-country heterogeneity. The main risk confronting households, corporates and property markets is their vulnerability with respect to a deteriorating economic environment, although the Eurosystem's liquidity-providing measures – particularly the three-year longer-term refinancing operations (LTROs) conducted in December 2011 and February 2012 – should help in preventing more adverse disruptions to the stable provision of credit for effective intermediation within the non-financial private sector.

2.1 HOUSEHOLD SECTOR CONDITIONS REMAIN HETEROGENEOUS ACROSS COUNTRIES

OVERALL ASSESSMENT OF RISKS IN THE HOUSEHOLD SECTOR

The balance sheet condition of the euro area household sector has improved slightly since the finalisation of the December 2011 FSR. The condition of households, however, remains highly heterogeneous across different euro area countries – with aggregate risks related to the economic outlook that affect the evolution of household income contrasting with considerable country-specific heterogeneity in household balance sheet positions. Weakened economic growth may, in turn, imply subdued loan growth.

Improvement in aggregate balance sheet conditions, but heterogeneity at the country level

A further risk for households remains the potential future downward corrections in housing markets in some euro area countries, which raises some concerns about the sustainability of the improvement in net worth in recent quarters, even more so as the outlook for economic activity in the coming quarters is generally muted. All in all, the household sector is not a predominant source of risk for financial stability in the euro area. However, the outlook has deteriorated, in particular in some countries. As a result, significant cross-country heterogeneity persists, and has even increased.

HOUSEHOLD SECTOR INDEBTEDNESS

The total indebtedness of euro area households remained broadly stable throughout the fourth quarter of 2011, standing at around 65% of GDP. At the same time, the dispersion of the country-specific developments underlying this aggregate euro area development widened slightly – with household indebtedness at the country level ranging from just under 30% of GDP to more than four times that level, namely in excess of 130% of GDP (see Chart 2.1 and Chart S.2.1).

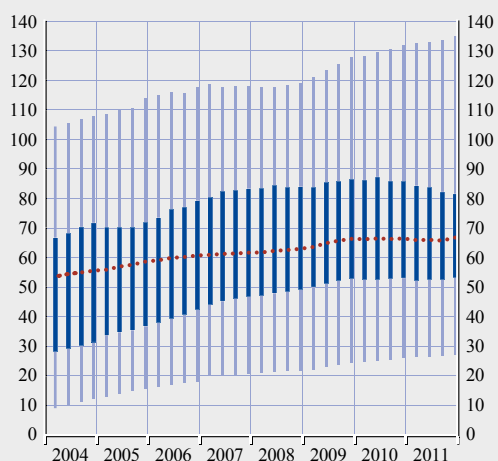
Households' indebtedness broadly stable...

Relatively subdued lending to the euro area household sector contributed to broadly stable household indebtedness at the euro area level, with household lending by monetary and financial institutions (MFIs) declining, on a year-on-year basis, in most countries (see Chart 2.2). This development was largely attributable to slower growth in lending for house purchase.

... amid weak household borrowing...

Chart 2.1 Total indebtedness of euro area households

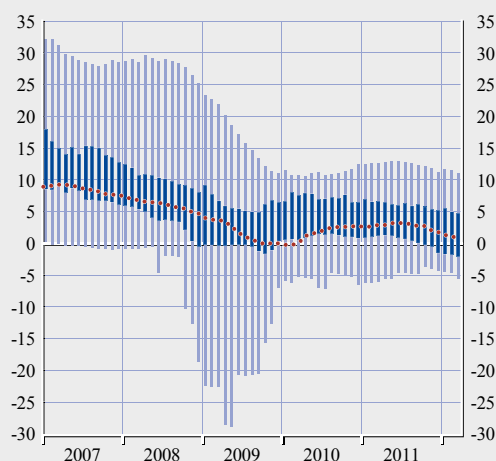
(Q1 2004 – Q4 2011; percentage of GDP; maximum, minimum, inter-quartile distribution and average)



Sources: Eurostat and ECB.

Chart 2.2 MFI lending to euro area households

(Jan. 2007 – Mar. 2012; percentage change per annum; maximum, minimum, inter-quartile distribution and average)



Source: ECB.

... that survey evidence suggests was demand-based

The latest ECB bank lending survey suggested that the muted MFI lending growth since the end of 2011 was mainly a function of contracting net demand for loans, and less a function of loan supply. Weaker growth and housing market prospects, the latter due partly to fading effects of past government support schemes for housing markets, as well as a significant decline in consumer confidence, were the main factors cited as causes of the reduced demand for loans for house purchase. In this vein, heterogeneity in household lending remained substantial at the country level – with the weakest household borrowing being observed in countries suffering from a combination of significant ongoing housing market corrections and weaker economic activity.

Indebtedness is likely to decrease in the period ahead

Looking ahead, the total indebtedness of the household sector is likely to decrease only moderately, with household sector deleveraging expected to be a long-lasting structural process in several euro area countries. This, in turn, may constrain private demand in terms of its support of economic activity. Strongly binding supply-side restrictions such as a further tightening of credit standards for household lending, by contrast, are expected to be contained by the abundant bank liquidity provided in the context of the Eurosystem's non-standard policy measures, in particular the three-year LTROs. Nevertheless, new regulatory requirements in the banking sector, as well as more structural deleveraging pressure on some banks, could lead to a lower supply of credit for households.

INTEREST RATE AND INCOME RISKS

Financing costs have declined...

The financing costs borne by the euro area household sector have declined slightly since the finalisation of the December 2011 FSR. The latest data suggest that the Eurosystem's liquidity-providing measures – particularly the three-year LTROs conducted in December 2011 and February 2012 – have reduced funding-induced pressures to ration lending in terms of either quantity or price – including, in particular, medium and long-term loans – by allowing banks to secure medium-term funding at low cost. At the same time, the full supportive impact of the Eurosystem's non-standard measures will need time to unfold and have a positive effect on the growth of loans when demand recovers.

Households have also taken some steps to reduce their vulnerability to interest rate risk by increasing the average interest rate fixation period, which currently stand at 2.5 years, up from 2.44 years at the time of the finalisation of the December 2011 FSR. Households thus took advantage of lower levels of long-term interest rates in some countries and shifted from short-term interest rate fixation periods (i.e. floating rates and interest rate fixation periods of up to one year) towards more long-term fixation periods (i.e. interest rate fixation periods of over five years). In particular, this pattern was observed in Belgium, Italy and the Netherlands. Nevertheless, households in most euro area countries still continue to opt for shorter interest rate fixation periods, which has left households in several countries sensitive to interest rate changes (see Chart 2.3).

Turning to households' income risks, labour market conditions in the euro area have weakened in the context of weakening macroeconomic growth. Unemployment rates increased in many euro area countries, in some cases from already high levels (see Chart 2.4). In fact, the current levels of unemployment were last recorded in mid-1997. With sluggish growth in employment, unemployment rates are expected to remain high and even to increase further in some countries in the short term.

While weak employment prospects would normally be expected to adversely affect the credit standing of the household sector, the gradual rise in euro area unemployment rates to date appears to have had few effects on loan write-off rates (see Chart 2.4). Although data on loan write-offs have to be assessed with care on account of diverging accounting standards at the country level, the correlation between unemployment and write-off rates on MFI loans to households appears to have broken down in recent quarters. This may be due, to some extent, to the fact that

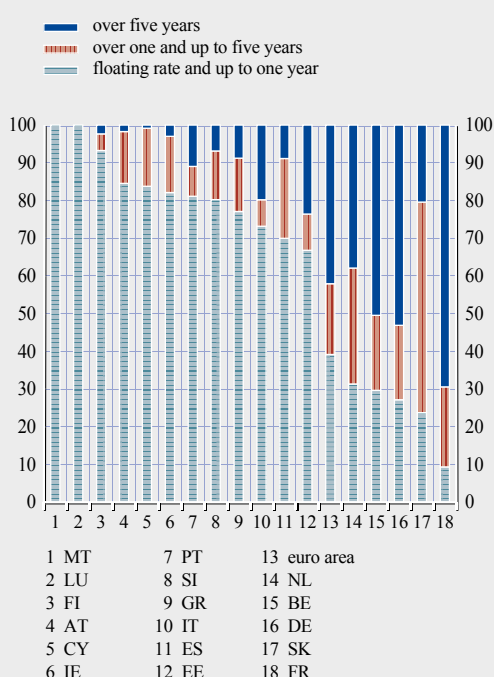
... and interest rates risk have receded somewhat...

... contrasting with rising income risks...

... which could lead to higher write-off rates

Chart 2.3 Initial interest rate fixation period in MFI lending to euro area households

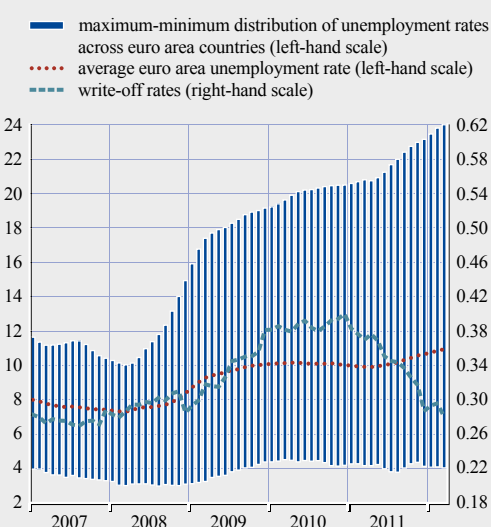
(Mar. 2012; percentage of total new loans)



Source: ECB.

Chart 2.4 Write-off rates on MFI loans to households and unemployment rates in the euro area

(Jan. 2007 – Mar 2012; percentages)



Sources: Eurostat, ECB and ECB calculations.

*Improving
profitability uneven
across countries
and sectors*

*Funding risks
have subsided,
but balance sheets
remain vulnerable*

*Moderate overall
improvement
in profitability...*

*... but the firm size
plays an important
role*

banks have shown forbearance with respect to their problematic loans. As a result, and also in view of the fact that the outlook for households' income positions has deteriorated for the euro area as a whole, write-offs are likely to increase, albeit moderately, going forward.

2.2 IMPROVED CONDITIONS IN THE CORPORATE SECTOR, BUT THE OUTLOOK HAS DETERIORATED

OVERALL ASSESSMENT OF RISKS IN THE CORPORATE SECTOR

In the euro area corporate sector as a whole, credit risks declined somewhat toward the end of 2011, owing to some improvement in firm profitability and a general easing of financing conditions. However, the observed overall improvement in profitability masked major disparities across sectors and countries – a situation that may continue to characterise the period ahead, in which earnings are expected to grow at a moderate pace.

Euro area corporate balance sheets continue to exhibit fragilities – with corporate sector indebtedness at elevated levels. Funding risk, however, has subsided after the three-year LTROs conducted by the Eurosystem in late 2011/early 2012. In particular, the large number of smaller banks participating in the Eurosystem's operations suggests that liquidity is now closer to small and medium-sized enterprises (SMEs). At the same time, the ability of firms to service their debt continued to be supported by the low interest rate environment, low corporate bond yields and increased earnings. Despite these improvements, refinancing risks remain for companies more vulnerable to bank deleveraging pressures and a tightening of bank lending standards. Some firms have been able to partly diversify their sources of financing in response to the perceived risk regarding the availability of bank credit, although this option was limited to larger companies with direct market access. Those segments that are most dependent on bank funding – inter alia, SMEs, as well as firms located in stressed countries and, in particular, countries under EU/IMF programmes – remain more vulnerable to restrictions in the credit supply.

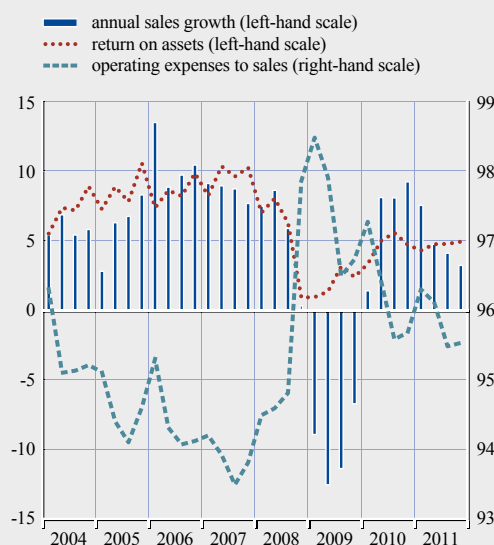
EARNINGS

The profitability of the euro area non-financial corporate sector as a whole improved somewhat in the course of 2011, albeit only to a limited extent. According to euro area accounts data, the gross operating surplus of euro area non-financial corporations increased slightly on an annual basis over the year. Higher profits were, in turn, reflected in an ongoing rise in firms' retained earnings.

Viewed in terms of the firm size, however, the improvement in conditions differed quite markedly. On the one hand, a continuation of this moderate improvement in firms' profitability and the expansion of retained earnings have been evident more recently for listed (and therefore generally larger) companies. An increase in sales in the last quarter of 2011, together with stable ratios of operating expenses to sales, result in slight improvements in the return on assets, which, in turn, increased the capacity of such firms to accumulate capital through retained earnings (see Chart 2.5).

Chart 2.5 Sales growth, return on assets and the operating expenses-to-sales ratio of listed non-financial firms in the euro area

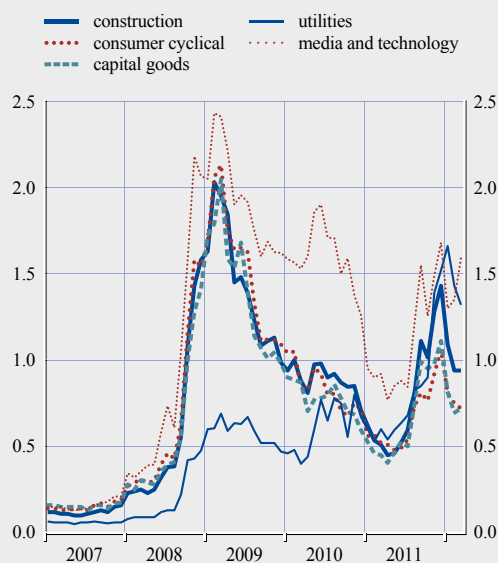
(Q1 2004 – Q4 2011; percentages; medians)



Sources: Thomson Reuters and ECB calculations.

Chart 2.6 Expected default frequency for selected non-financial sectors in the euro area

(Jan. 2007 – Mar. 2012; percentage probability)

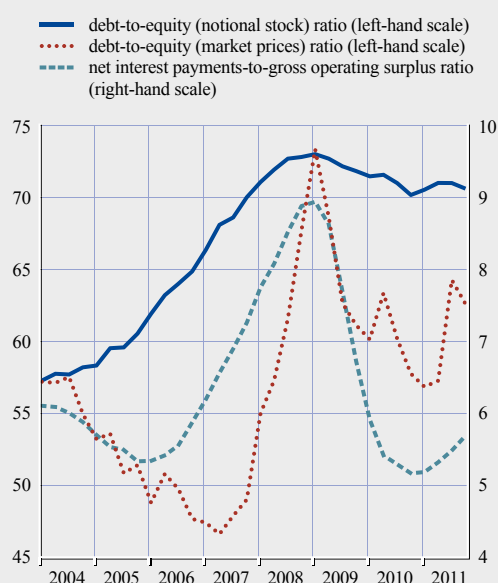


Sources: Moody's KMV and ECB calculations.

Notes: The expected default frequency provides an estimate of the probability of default over the following year. The "capital goods" sector covers the production of industrial machinery and equipment.

Chart 2.7 Total debt and interest burden of non-financial corporations in the euro area

(Q1 2004 – Q4 2011; percentages)



Sources: ECB and ECB calculations.

The rise in profitability was evident for listed firms across all major industrial sectors and contributed to a decline in expected default frequencies in most non-financial corporate sectors (see Chart 2.6). Profits of SMEs, by contrast, continued to deteriorate at the turn of the year, according to the ECB's latest survey on the access to finance of SMEs in the euro area. Indeed, euro area SMEs reported a slight decrease in turnover, and a higher net percentage reported a deterioration in profits. Moreover, small corporations participating in this survey found access to bank credit more difficult in the period from October 2011 to March 2012, especially in Greece, Portugal and Italy.

Going forward, non-financial corporate earnings are likely to be negatively affected by weaker economic activity, which is in line with the earnings expectations of market participants. Apart from a slowdown in global demand, which would affect mainly large multinational companies, contained domestic demand – which may also entail an important country-specific dimension within the euro area – is likely to also negatively impact the profitability of firms, such as SMEs, with a predominantly domestic base.

LEVERAGE AND FUNDING

The corporate sector's leverage has remained broadly unchanged since the finalisation of the December FSR (see Chart 2.7). Although leverage has declined slightly since the peak in 2008, it remains high in some countries (see Chart S.2.5), especially at this point of the economic cycle and particularly in the construction as well as the transport and communication sectors. In addition, equity price developments have caused indebtedness as a share of total equity to be volatile in recent quarters (see Chart 2.7). Notwithstanding relatively high leverage, firms' ability to service their outstanding debt – measured as the ratio of net interest payments to the gross operating surplus – has remained at a historically low level, although it increased slightly in the most recent quarters (see Chart 2.7).

Weaker economic activity expected to weigh on the outlook

Leverage remained broadly stable at elevated levels

Refinancing risks remain, but are tempered by LTROs...

... and, in some cases, disintermediation activities

Refinancing risks therefore persist – particularly for those companies that are more vulnerable to a reduction in the supply of bank loans, amid bank deleveraging pressures, including tighter bank lending standards. These risks, however, have been tempered by the Eurosystem's three-year LTROs, which have alleviated funding-related impediments in financial institutions so as to ensure an adequate flow of credit from banks to corporates and households. The ECB's latest bank lending survey – conducted during the first quarter of 2012 – indicated a marked reduction in the net tightening of credit standards applied to bank loans to non-financial firms, in particular SMEs (see Chart 2.8). This mainly reflected milder pressures from both the cost of funds and balance sheet constraints, in particular with respect to banks' access to funding and their liquidity positions.

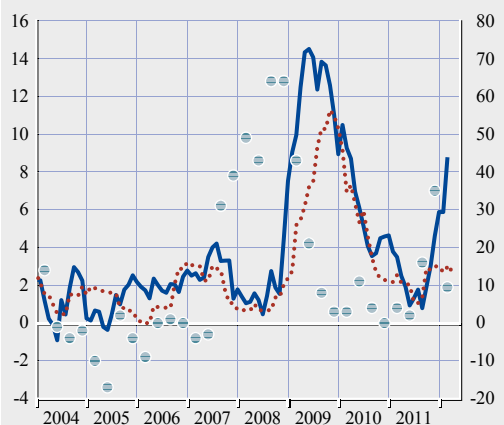
At the turn of 2011, some firms have also been able to diversify their sources of financing in response to tighter lending standards, although the option of disintermediation has thus far been limited mainly to larger companies that are generally domiciled in larger countries with more developed corporate bond markets (see Box 3 and Chart 2.8). Access to market-based funding, however, has been characterised by broadly diverging developments in debt and equity financing, as well as by substantial cross-country disparities. The cost of quoted equity remained at historically high levels, while the aggregate real cost of market-based debt fell and remained below its long-term average, on aggregate (see Chart 2.9). In terms of issuance activity, the annual growth rate of debt securities issued rebounded, whereas equity issuance remained broadly unchanged at very low levels.

The financial stability consequences of corporate disintermediation are not, *prima facie*, straightforward to characterise. On the one hand, they can be viewed positively in terms of financial stability, as disintermediation reduces firms' dependence on one specific source of financing. On the other hand, an increase in corporate bond issuance is not without risk, as it has been followed in

Chart 2.8 Euro area corporations' issuance of debt securities, default rates and bank lending standards

(Jan. 2004 – Apr. 2012)

— net issuance of long term debt securities (EUR billions; left-hand scale)
 speculative-grade rated corporate bond default rate (percentages; left-hand scale)
 ● bank lending standards (net percentages; right-hand scale)



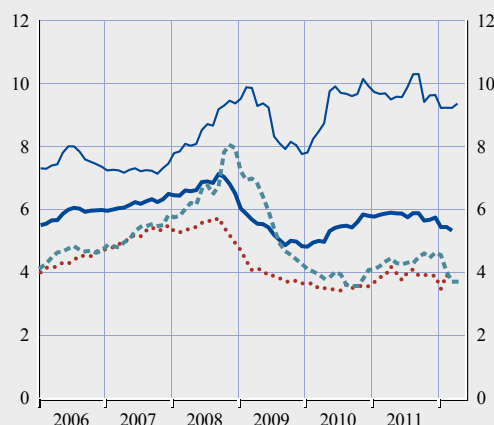
Sources: ECB and Moody's.

Note: Data for long-term debt securities are six-month moving averages and data for default rates are 12-month trailing sums.

Chart 2.9 Cost of the external financing of euro area non-financial corporations

(Jan. 2006 – Apr. 2012; percentages)

— overall cost of financing
 long-term MFI lending rates
 - - - cost of market-based debt
 — cost of quoted equity



Sources: ECB, Thomson Reuters, Merrill Lynch, Consensus Economics forecasts and ECB calculations.

the past by higher corporate default rates (see Chart 2.8). This correlation can partly be explained by a phenomenon whereby firms with lower credit quality enter bond markets when banks reduce their supply of credit and tighten their lending standards. In the period ahead, however, the increase in default rates could be less pronounced than in the period from 2009 to 2010 since the cost of market-based debt is historically low at present (see Chart 2.9), which should reduce debt servicing costs considerably.

Those segments that are most dependent on bank funding – inter alia, SMEs, as well as firms located in countries whose sovereign debt markets are under stress and, in particular, in countries under EU/IMF programmes – remain more vulnerable to restrictions in the supply of bank credit. More specifically, according to the latest survey of SMEs, financing conditions for SMEs are diverse across euro area countries, with clear financing obstacles for SMEs in countries that are affected more strongly by the crisis.

Box 3

IS DISINTERMEDIATION BY EURO AREA CORPORATES WITH RESPECT TO THEIR EXTERNAL FINANCING POSSIBLE IF BANKS REDUCE THE SUPPLY OF LOANS?

Non-financial corporations rely on two main sources of external financing: borrowing from banks and direct issuance of securities (such as shares and bonds) on the capital market. A traditionally higher reliance on bank financing in the euro area contrasts with a generally more important role for capital market-based funding in the United States.¹ This has implied a particularly acute vulnerability of euro area non-financial corporations to reductions in the supply of bank loans. At the same time, the ongoing structural deleveraging that is taking place in the banking sector as a general process of adapting bank business models to a post-crisis operating environment has implied scope for a disintermediation of banks and – by extension – growing room for euro area non-financial corporations to increasingly seek access to direct market funding. This box examines corporate financing developments during 2009-10 in order to assess the extent to which euro area corporates have already engaged in such financial disintermediation.

The growth of lending by monetary financial institutions (MFIs) – a category comprising mainly banks – to euro area non-financial corporations decelerated sharply throughout 2008, and lending subsequently even contracted in parts of both 2009 and 2010 (see Chart A). This movement reflected reduced demand for loans – in a period of weak economic activity – but also some supply-side developments.² Indeed, according to the ECB's bank lending survey, euro area banks reported a substantial tightening of lending standards on corporate loans throughout the period from the second half of 2007 to the middle of 2009 (see Chart A).

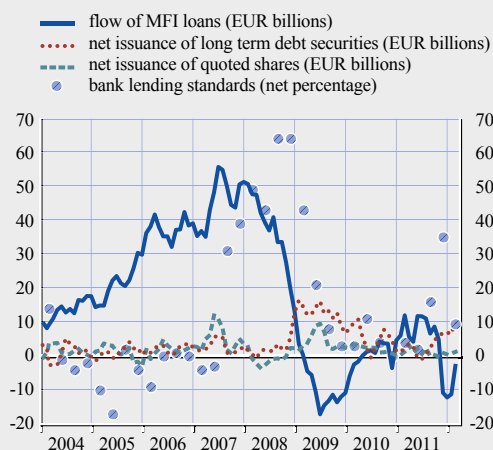
The negative correlation between MFI loans and securities issuance at the euro area level over this period could indicate that corporates were able to fill the financing void left by banks by increasing their direct tapping of debt markets (see Chart A). This would suggest that a reduced supply of bank loans need not necessarily result in financing difficulties for corporates that can turn

1 See ECB, "The external financing of household and non-financial corporations: a comparison of the euro area and the United States", *Monthly Bulletin*, April 2009.

2 See ECB, "Recent developments in loans to the private sector", *Monthly Bulletin*, January 2011.

Chart A Non-financial corporate financing and bank lending standards in the euro area

(Jan. 2004 – Apr. 2012)



Sources: ECB and Moody's.

Note: Data for MFI loans and long-term debt and quoted share issuance are three-month moving averages.

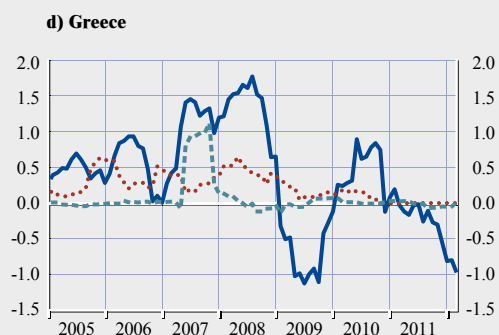
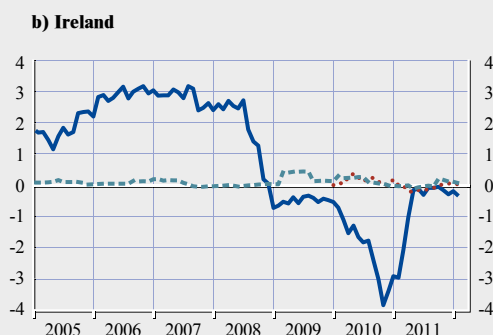
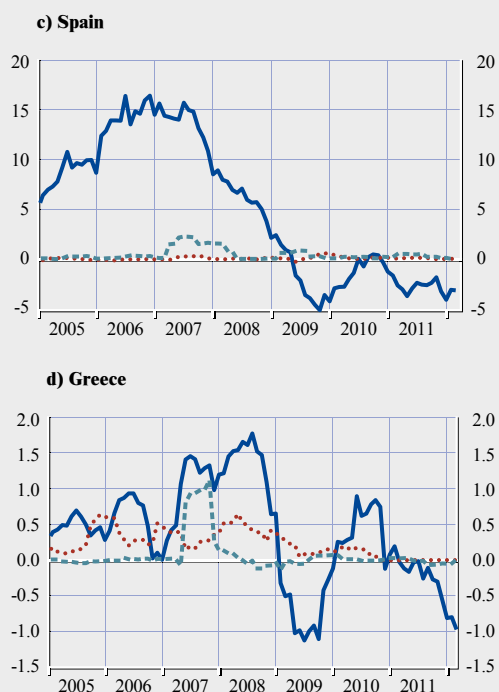
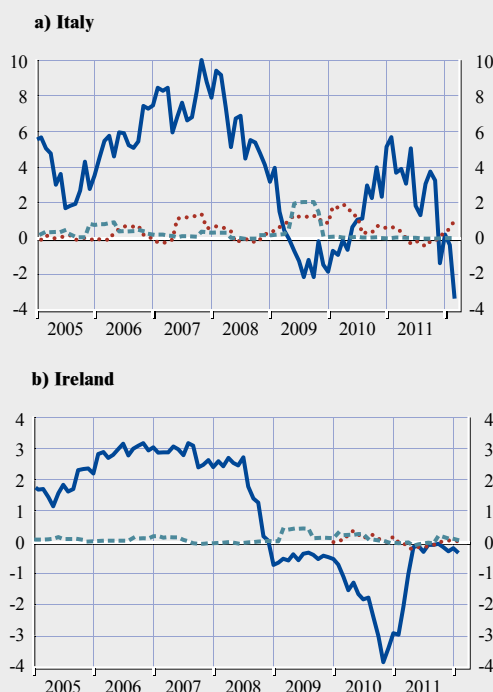
to capital markets for financing – although such opportunities would be limited for the SMEs, which account for a large proportion of the euro area corporate sector. Cross-country disparities may cause the scope for disintermediation to vary – not only because corporates in some countries are more dependent on bank lending than others, but also because large and liquid corporate bond markets exist in only some euro area countries (such as Germany, France, Italy, the Netherlands and Belgium). As a result, in countries such as Spain, Ireland, Greece, Slovenia and Cyprus, capital market-based financing did not fill the gap left by the reduction of bank lending in 2009-10 (see Chart B).

At the aggregate level, a more systematic empirical analysis for the euro area supports the notion that tightening bank lending standards

Chart B Euro area corporations' MFI loan transactions and issuance of long-term debt securities and shares

(Jan. 2005 – Apr. 2012; EUR billions; six-month moving averages)

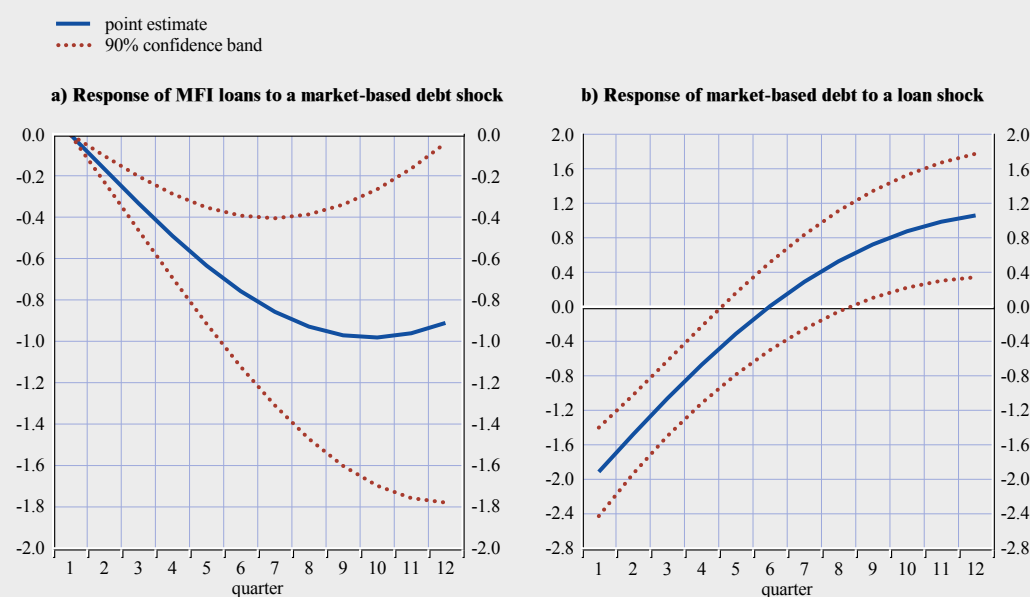
— flow of MFI loans
 net issuance of long-term debt securities
 - - - net issuance of quoted shares



Source: ECB.

Chart C Estimated impulse response function of a shock to market-based debt and loans of non-financial corporations in the euro area

(percentages; deviation from annual baseline growth rate)



Sources: ECB and ECB calculations.

Notes: The VAR model is estimated on the basis of quarterly data covering the period from the first quarter of 1991 to the last quarter of 2011. The number of lags is selected with an Akaike information criterion. The residuals are orthogonalised through a Choleski identification scheme where entrepreneurial income comes first, followed by real bank lending rates on loans to non-financial corporations (NFCs), then MFI loans to NFCs, then NFC debt and, finally, business investment.

have tended in the past to be associated with episodes of relatively higher corporate issuance of debt securities. Specifically, a VAR model estimated over a longer sample that included two recessions (1992-93 and 2008-09), as well as a downturn (2002-03), provides some evidence of substitution between bank finance and securities issuance. The results indicate that a positive shock to bank loans tends to depress market debt issuance for up to one year (see Chart C), with the converse holding true for negative shocks to bank loans. Hence, a negative shock to loans is to some extent compensated for by a rise in securities issuance. Tighter lending standards in the form of negative loan shocks may explain part of the recent acceleration in debt securities issuance at the euro area level. The uncertainty surrounding the substitution effect is large, however, as shown by the width of the confidence bands. In addition, it cannot be excluded that specific factors played a role in the period 2009-10, such as the very large issuance volumes of a few corporations.

Looking ahead, with corporate bond yields below their long-term average and close to bank lending rates, current price conditions appear favourable for corporate bond issuance. Indeed, most recent data show an increase in debt securities issuance, accompanied by a contraction of the flow of MFI loans to euro area corporates (see Chart A). However, as discussed in this box, corporate bond markets in the euro area are dominated by larger corporates in a limited number of euro area countries. Smaller companies and companies located in countries with less developed corporate bond markets are therefore more vulnerable to tightened bank lending standards.

2.3 PROPERTY PRICE MISALIGNMENTS IN SOME COUNTRIES COMBINED WITH REFINANCING RISKS

OVERALL ASSESSMENT OF RISKS IN THE PROPERTY MARKETS

Property market risks remain elevated...

Financial stability risks stemming from euro area property markets have remained elevated since the finalisation of the December FSR. After a further contraction in euro area property prices at the end of 2011, a weaker economic environment contributed to the renewed weakness, particularly in already fragile segments, while central bank measures have contained the tightening of lending conditions that could be observed throughout much of 2011.

... in both the residential...

Where residential property is concerned, housing appears to remain overvalued in several countries, with steeply rising house prices in some jurisdictions contrasting with ongoing downward adjustments in others. Indeed, there is a strong country-specific component in the valuation of housing, given the inherent fragmentation of such markets across euro area countries – with some residential property markets vulnerable to corrections in prices, with the potential for further credit losses for banks.

... and the commercial property markets

With respect to commercial property markets, the favourable developments observed in the first three quarters of 2011 lost momentum at the end of the year and in the first quarter of 2012 – with conditions deteriorating in some euro area countries. In addition, with capital values in many countries well below the peaks seen around 2007, refinancing risks for many loan-financed property investors remain significant, in particular in the context of structural bank deleveraging pressures.

RESIDENTIAL PROPERTY MARKETS

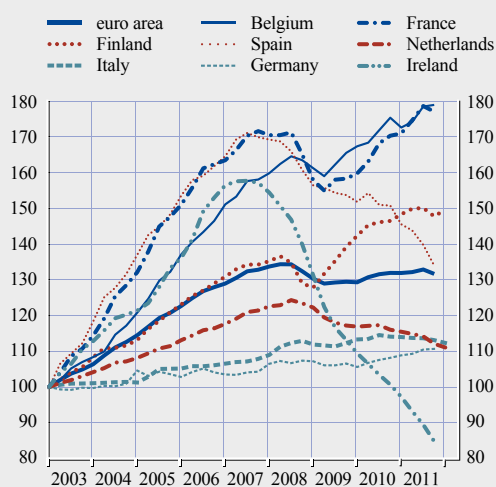
Residential property prices declined...

... but with greatly differing developments across countries...

Data that became available after the finalisation of the last FSR imply a further decrease of aggregate euro area house prices. In the fourth quarter of 2011, residential property prices decreased by 0.2%, year on year, down from an increase of 1.0% in the third quarter of 2011. Widely diverging developments were apparent at the country level, however (see Chart 2.10). Indeed, Ireland, Greece, Spain, Cyprus, the Netherlands, Slovakia and Portugal continued to see house prices fall. Germany, Malta, Luxembourg, Slovenia, Finland and Italy, by contrast, recorded modest increases in residential property prices, while house price increases in Belgium, France, Estonia and Austria were close to, or in excess of, 4%. The relatively significant house price increases in Belgium and France were coupled with a still marked overvaluation in the housing markets, according to commonly used valuation measures (see Chart 2.11). At the same time, more rapidly rising prices in the German housing market appear to be broadly in line with developments in selected fundamentals, while falling prices in Spain appear consistent with an ongoing adjustment of the overvaluation remaining as a legacy of the pre-crisis period.

Chart 2.10 Residential property prices in the euro area and selected euro area countries

(Q1 2003 – Q1 2012; index: Q1 2003 = 100)



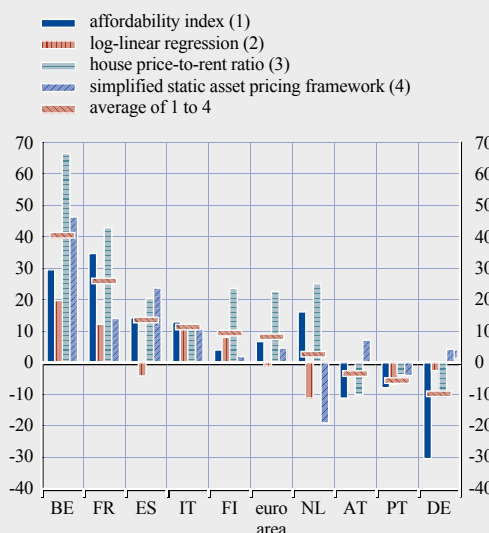
Source: ECB.

On the supply side of the housing market, residential investment grew by 0.8%, year on year, in real terms in the fourth quarter of 2011. However, the number of building permits granted suggests subdued developments in residential investment at the end of 2011 and the beginning of 2012. The overall development of the aggregate short-term indicators, however, masks divergent trends across the large euro area countries. With respect to demand for housing, it is expected to be negatively influenced by the euro area outlook for real disposable income and unemployment, as well as by the increased uncertainty around this outlook. All in all, various indicators point to a weakening of the house price outlook, with risks tilted to the downside both at the aggregate level and in several countries.

An abrupt unwinding of housing imbalances in larger euro area economies would have significant implications for financial stability because the eventual mark-downs on the value of residential property loan portfolios could put a strain on financial sector balance sheets. Possible triggers for residential property price corrections include a weaker growth outlook, which could undermine households' debt servicing capabilities, in particular in countries where the household sector is highly leveraged.

Chart 2.11 Residential property price valuation measures for selected euro area countries

(estimated percentage overvaluation)



Sources: Eurostat, OECD, national sources and ECB calculations. Notes: Estimates are based on data up to the fourth quarter of 2011 for all countries except Italy, where they are based on semi-annual data up to the second half of 2011. For details, see Box 3 in ECB, *Financial Stability Review*, June 2011.

... and the outlook has deteriorated with increasing downside risks

COMMERCIAL PROPERTY MARKETS

Previously witnessed improvements in commercial property markets have lost momentum in most euro area countries since the finalisation of the December FSR, with conditions deteriorating in several countries. Capital value growth decelerated, on average, in the fourth quarter of 2011, before rising slightly in the first quarter of 2012 (see Chart 2.12). However, the increase in the first quarter of 2012 was largely driven by developments in France and Austria, while values continued to fall in around half the euro area countries. Looking ahead, commercial property value growth is likely, on average, to remain sluggish, or to turn negative, in the euro area in the coming quarters. In addition, the deteriorating economic outlook has increased the uncertainty surrounding future commercial property developments.

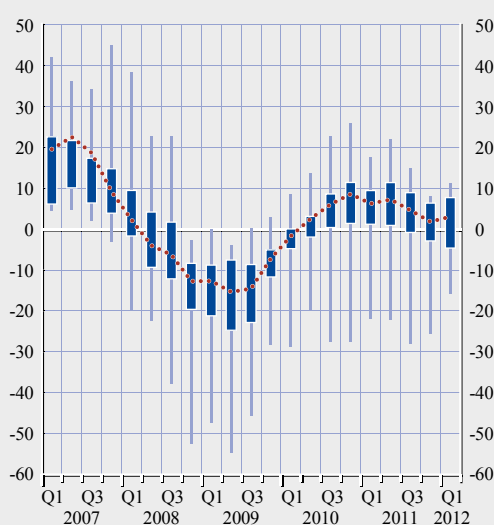
Developments at the country level, however, continue to diverge widely. On the one hand, capital values declined in countries such as Greece, Ireland, Spain, Portugal and Belgium, while notable increases were recorded in Austria, Finland and France. Diverging developments have also been recorded for rents. Whereas, rents increased by, on average, some 2%-3%, year on year, in the fourth quarter of 2011 and in the first quarter of 2012, significantly falling rents were witnessed, in general, in those countries that also saw declining property values.

Improvements in commercial property markets have lost momentum...

... albeit with diverging developments across countries

Chart 2.12 Changes in the capital value of prime commercial property in the euro area countries

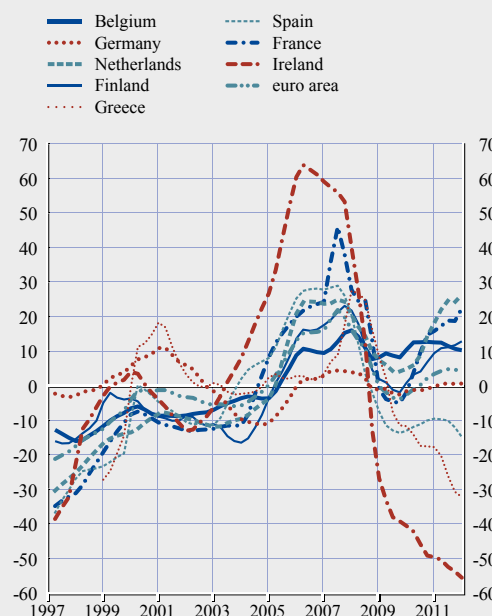
(Q1 2007 – Q1 2012; percentage change per annum; maximum, minimum, inter-quartile distribution and weighted average)



Source: Jones Lang LaSalle.
Note: Data for Cyprus, Estonia, Malta, Slovakia and Slovenia are not available.

Chart 2.13 Average value misalignment of prime commercial property in selected euro area countries

(Q1 1997 – Q1 2012; percentage deviation from average values from Q1 1997 to Q1 2012; two-quarter moving average)



Sources: Jones Lange LaSalle, ECB and ECB calculations.
Note: For details, see Box 6 in ECB, *Financial Stability Review*, December 2011.

Refinancing risks for property investors have increased

On account of the disparate country-level developments, the range of valuation measures increased markedly across countries (see Chart 2.13), with some countries seeing an increase in valuations relative to fundamentals, and others declines. There were, however, no signs of any large-scale value misalignments in the euro area as a whole (see Chart 2.13).

The main risks for euro area financial stability stemming from commercial property markets are refinancing risks for loan-financed investors, as there are increasing refinancing risks as a result of bank deleveraging pressures that are structural in nature. A large proportion of the commercial property mortgages outstanding in the euro area is due to mature by 2013. Many of these mortgages were originated or refinanced when commercial property prices peaked in 2006-07, and were often granted with high loan-to-value ratios (often 75%-85%). Since commercial property prices in many euro area countries currently stand well below the peak levels and since the outlook has deteriorated in many cases, refinancing risks for property investors remain significant.

Nevertheless, the commercial property financing gap left by deleveraging banks is expected, to be filled to some extent, by alternative providers of funding. In particular, insurers have stepped up their lending to take advantage of the decline in competition from banks, which has pushed commercial property lending rates higher.

2.4 FISCAL SITUATION IMPROVES, BUT SUSTAINABILITY CONCERNS REMAIN HIGH

OVERALL ASSESSMENT OF RISKS IN THE GOVERNMENT SECTOR

Despite continued progress in fiscal adjustment since the December 2011 FSR, sovereign stress has remained high in the euro area. This has been aggravated by political uncertainty, in particular in Greece, as well as by concerns regarding the extent of adverse feedbacks between fiscal adjustment, economic growth prospects and remaining financial sector challenges in countries under stress. At the same time, the outlook for fiscal sustainability should benefit from two factors. First, national fiscal adjustments, combined with structural reform efforts, have contributed to improving fiscal fundamentals, and the short and medium-term fiscal outlook for the euro area as a whole. Second, intergovernmental initiatives, such as the agreement reached on the “fiscal compact” in early 2012, have led to progress in strengthening the foundations for a stable Economic and Monetary Union.

Despite the policy action taken at both the national and the euro area level to address fiscal imbalances and structural distortions, challenges to fiscal sustainability remain for several countries. Most importantly, while the progress made in fiscal consolidation has been sizeable, underlying fiscal positions remain precarious in many countries and call for sustained consolidation efforts.

In particular, government debt remains high in most euro area countries, and this is exacerbated in some cases by relatively low residual maturities with implied strong near-term issuance needs (see Charts 2.14 and 2.17). A sovereign crisis of the scale witnessed over the course of 2011 leaves little room for postponing the necessary corrections for a durable lowering of sovereign risk – not

The fiscal situation in the euro area has improved ...

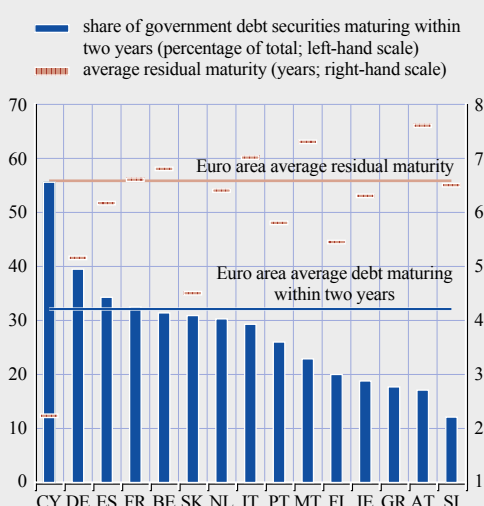
... but many challenges remain, namely...

... precarious fiscal positions in some countries...

... and an interplay with other factors affecting sustainability...

Chart 2.14 Share of government debt securities maturing within two years and average residual maturities

(end-March 2012)

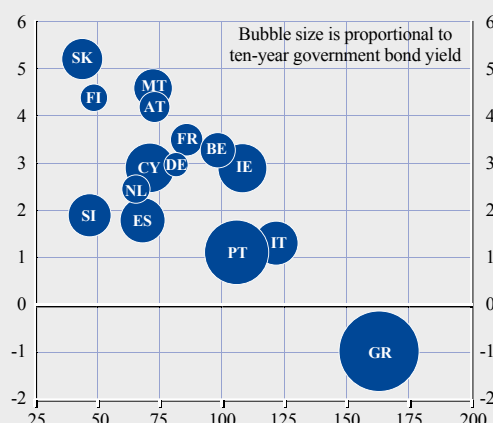


Source: ESCB.

Notes: After the debt exchange in the context of private sector involvement (PSI) in Greece, the average residual maturity of Greek government securities was extended from 6.7 years at end-February to 15.8 years (line not shown in the chart) at end-March 2012, while the share of government securities maturing within two years was reduced from 30.2% to 17.7%. In the case of Cyprus, the share of debt maturing within two years does not include the special-purpose bond of €2.8 billion (see footnote 3 for more details).

Chart 2.15 Fiscal positions, the macroeconomic outlook in euro area countries and long-term government bond yields

x-axis: general government debt (2011; percentage of GDP)
y-axis: expected GDP growth (2012-15; average percentage change per annum)



Sources: Eurostat, IMF WEO, Reuters and ECB calculations.

Notes: The bubble size is proportional to the ten-year government bond yield (average for April 2012). The chart does not include Luxembourg and Estonia, owing to the lack of data on ten-year government bond yields.

*... and argue
for an effective
implementation of
the surveillance
framework*

*Substantial decline
in the euro area
budget deficit
in 2011 and an
improved outlook...*

only to reduce vulnerability and contagion in the near term, but also to strengthen the resilience of public sector balance sheets in the long run.¹ Fiscal sustainability, however, depends on many factors – notably the fiscal starting positions and contingent liabilities that dictate the scale of fiscal adjustment, together with economic growth prospects. Clearly, high government debt burdens weigh heavily on growth and sovereign risk prospects (see Chart 2.15).² The link between fiscal adjustment and economic growth prospects has therefore received considerable attention. Any adverse short-term economic impact of a coordinated fiscal contraction is to be compensated for over the longer term, when the output effects of fiscal consolidation are positive and sizeable, in particular if fiscal consolidation is expenditure-based and well-targeted. Moreover, for countries with fiscal sustainability concerns, any fiscal expansion would be likely to lead to a closure of financial markets, thus defeating the purpose of boosting output in the short run. For countries with weak competitiveness, a strengthened role for complementary structural reforms has been identified, while timely ECB action has limited critical impediments to effective bank intermediation in supporting economic prospects. In addition, potential adverse feedbacks between the financial and the government sectors remain a key risk to financial stability in the euro area. In this vein, contingent fiscal liabilities have continued to be a source of concern in several countries – irrespective of whether they are related to existing government support for the financial sector, to potential further bank recapitalisation needs, or to European sovereign firewalls. Lastly, independent of the evolution of relevant domestic fundamentals in countries under strain, perceptions of vulnerability – whether justified or not – may themselves have created self-fulfilling dynamics, whereby persistently high government bond yields (see Section 3.1) place additional pressure on governments’ fiscal positions through high financing costs.

While market pressure for policy action may ebb just as fast as it had grown, changes in the governance underpinning EMU should provide a non-state-contingent means of ensuring more sustainable fiscal and macroeconomic dynamics at the national level. Indeed, wide swings in the market pricing of sovereign debt have strengthened the need for effective fiscal governance that is consistent across both countries and time as a tool for the prevention of any re-emergence of sovereign strains of the type witnessed in the euro area over much of last year. Risks in this respect relate to a potentially lax implementation of the enhanced surveillance framework at the EU level, or to the possible failure of some countries to fully implement the intergovernmental treaty, which includes the “fiscal compact”. That could weaken market confidence in the progress made thus far and pose additional risks to fiscal sustainability.

LATEST FISCAL DEVELOPMENTS

Following the adoption of further consolidation measures, the government budget deficit for the euro area as a whole improved substantially in 2011 (to 4.1% of GDP, compared with 6.2% of GDP a year earlier) – in line with the projections at the time of the December 2011 FSR. The fiscal outlook for the euro area as a whole has improved slightly since the European Commission’s autumn forecast, with the deficit projected to continue to decline to 3.2% of GDP in 2012 and to 2.9% of GDP in 2013.

1 Demographic pressures imply higher long-term budgetary costs. According to the 2012 Ageing Report released by the European Commission and the Economic Policy Committee on 15 May, strictly age-related spending in the euro area is projected to increase by about 4.5 to 5.3 percentage points of GDP over the period from 2010 to 2060. The implementation of pension reforms in a number of countries is estimated to lead to a more moderate increase of age-related spending in comparison with that projected in several cases in the 2009 Ageing Report.

2 See, inter alia, C. Checherita and P. Rother, “The impact of high and growing government debt on economic growth – an empirical investigation for the euro area”, *ECB Working Paper Series*, No. 1237, 2010, and S. G. Cecchetti, M. S. Mohanty and F. Zampolli, “The Real Effects of Debt”, *BIS Working Papers*, No. 352, 2011, which show that high public debt above a certain threshold has a negative impact on growth. A large body of empirical literature focusing on the euro area also finds that higher government debt-to-GDP ratios induce higher long-term sovereign bond yields spreads (relative to Germany).

Fiscal developments have differed considerably across countries, however – with a deteriorating macroeconomic outlook as a result of both domestic and external forces weighing heavily thereon in some countries. In Spain, in particular, the 2011 deficit turned out to be worse than expected, by about 2.5 percentage points, compared with the government target, and by 1.8 percentage points in comparison with the Commission’s autumn forecast. This slippage, coupled with the significant contraction of output now forecast for the current year, implies that far greater fiscal adjustment than had previously been expected needs to be undertaken in 2012 and beyond. In the countries subject to EU/IMF programmes, the 2011 fiscal outcomes were below target: in Ireland, this was due to statistical reclassifications linked to the government’s support for the banking sector, and in Greece, it was due to both a stronger-than-expected recession and slippages in implementation of the EU/IMF programme. In Portugal, the 2011 deficit turned out to be much better than expected in autumn last year, but this was due to a large one-off pension fund transfer from the banking sector to the general consolidated budget. As for the fiscal prospects, Ireland remains broadly on track with respect to meeting the 2012 target under the EU/IMF programme, while a significantly larger adjustment is needed in Portugal on account of the deterioration in macroeconomic activity. In Greece, following the adoption of further structural and fiscal consolidation measures in parallel with the debt exchange, a successor programme was approved in March this year, thus initially alleviating market concerns about a disorderly default. However, the inconclusive results of the elections on 6 May have placed in question whether the country will be able to fulfil its commitments under the programme and have deepened the uncertainty about the path of fiscal adjustment in Greece. On the other hand, Italy met its fiscal target for 2011 and the consolidation measures approved in late 2011 have also improved the outlook for 2012 in comparison with the autumn forecast. Broadly, market confidence with respect to Italy’s public finances has also strengthened since the December 2011 FSR, with ten-year bond yields in March falling below those of Spain for the first time since August last year.

... but large cross-country differences remain

Fiscal governance has also seen a further strengthening since the finalisation of the December 2011 FSR – with several new initiatives now requiring timely enforcement. First, on 2 March 2012, all euro area countries and eight non-euro area EU Member States signed a new intergovernmental Treaty on Stability, Coordination and Governance in the Economic and Monetary Union. The embedded fiscal compact is a step forward towards a true “fiscal stability union” in that it provides for, inter alia, a binding fiscal rule at the national level that is aimed at ensuring sound budgetary positions that are close to balance or in surplus after netting-out cyclical and one-off factors. An important aspect is that these rules are legally enshrined as the signatory Member States are required to introduce the stipulated fiscal rules, together with an automatic correction mechanism in the case of any deviation from the fiscal objective, into their constitution – or equivalent law of higher level than the annual budget law. Overall, if strictly implemented and enforced, the fiscal compact should strengthen the existing fiscal governance framework and provide a better anchor for fiscal discipline in the euro area.

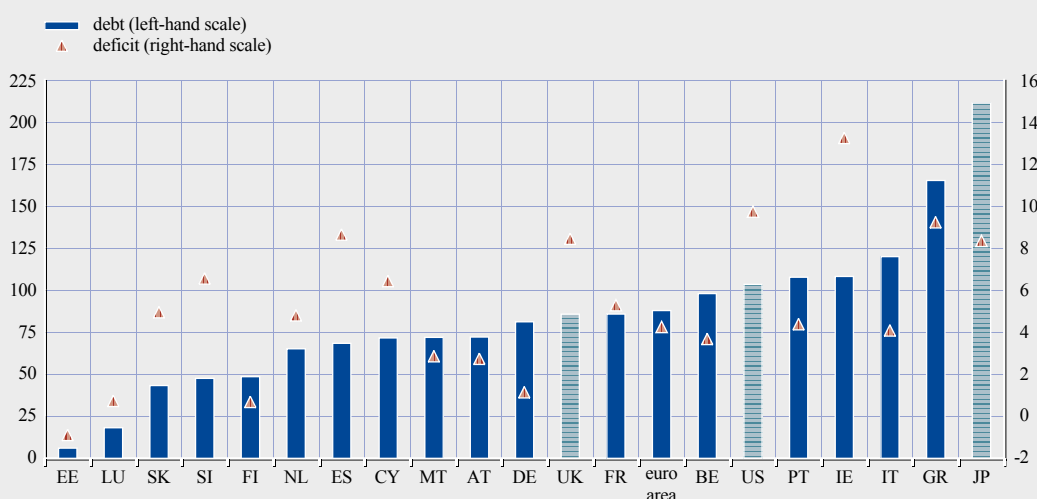
Several important policy initiatives have advanced at the EU level

Second, the so-called “two-pack” also entails elements that strengthen fiscal governance in the EU through its intensified economic and budgetary surveillance of Member States that are experiencing, or are threatened by, serious financial stability difficulties, while also better integrating fiscal monitoring and assessment in the euro area countries. In particular, the proposal to require budgetary plans to be grounded on macroeconomic and fiscal projections undertaken by independent councils would enhance the monitoring of budgetary plans.

Third, as part of the enhanced governance framework (“six-pack”), effective as of December 2011, the first Alert Mechanism Report was already published in February 2012, as an initial step in

Chart 2.16 Gross general government debt and budget deficit ratios in the euro area, the United States, the United Kingdom and Japan

(2011; percentage of GDP)



Source: European Commission.

Note: The data for the United States and Japan are not fully comparable to the euro area data as they are not compiled according to the European accounting methodology (ESA 95).

the new macroeconomic imbalance procedure that is aimed at complementing the assessment of fiscal imbalances with private sector vulnerabilities. Based on the initial reading of the scoreboard indicators, the Commission has selected seven euro area and five non-euro area EU Member States for an in-depth review of relevant internal and external macroeconomic imbalances. Depending on the outcome of the in-depth reviews, a Council recommendation for further policy action can be addressed to the relevant Member States under the preventive or corrective arms of the procedure.

Finally, a durable strengthening of European firewalls has resulted from the Treaty establishing the European Stability Mechanism, which is scheduled to enter into force in mid-2012. The European Financial Stability Facility (EFSF) and the European Stability Mechanism (ESM) add crucial tools to the EMU framework for addressing systemic crises that threaten the financial stability of the euro area as a whole – given the relatively strong fiscal position of the consolidated euro area in comparison with other key advanced economies (see Chart 2.16). Moreover, at the end of March, the Eurogroup decided that the overall ceiling for ESM/EFSF lending will be raised to €700 billion by combining new funds into a permanent rescue mechanism with existing bailout loans. In addition, the paid-in capital of the ESM will be made available more quickly than initially foreseen, while the EFSF will remain active until mid-2013. As of mid-2013, the maximum lending volume will be €500 billion. The euro area finance ministers also agreed to provide additional €150 billion as bilateral contributions to the IMF in order to strengthen its general capacity to combat crises in the future. While creating important firewalls for euro area sovereigns, the EFSF/ESM is subject to a trade-off between the capacity to address financial contagion and the creation of distorting fiscal incentives. To reduce fiscal distortions stemming from moral hazard, as of 1 March 2013, only euro area countries that have ratified the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union can be granted financial assistance under the ESM.

SOVEREIGN FINANCING NEEDS

In addition to longer-term fundamentals affecting fiscal sustainability, financial stability risks may also emanate from near-term liquidity needs of euro area sovereigns – particularly those under stress. In this vein, euro area governments' average gross financing needs, expressed as a share to GDP, are expected to decline slightly in 2012, as compared with 2011, mainly in reflection of smaller deficits. At the end of March 2012, the gross financing needs remained above 15% of GDP in more than half the euro area countries (see Chart 2.17).

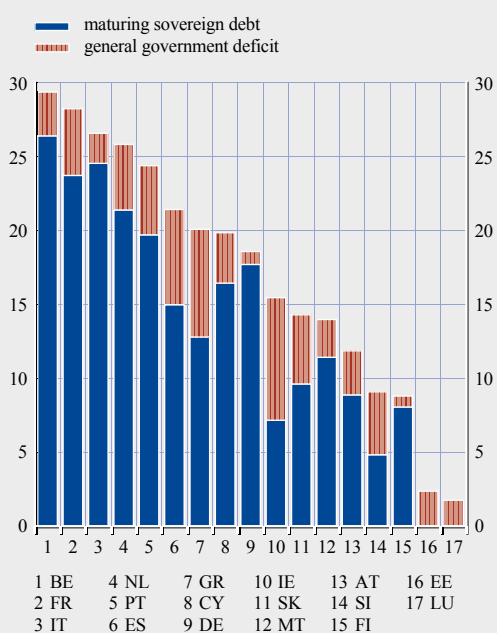
At the end of March 2012, the share of securities with a residual maturity of up to one year had declined slightly to around 20.6% of total debt securities outstanding since December 2011, while about 32% of euro area government debt securities outstanding will mature within two years. However, the maturity structure of government debt securities differs across countries. For example, the share of debt securities maturing within two years currently ranges from 13% in Slovenia to 56% in Cyprus (see Chart 2.14).

The exposure of indebted governments to changing market sentiment may be higher if a larger share of public debt is held by foreign investors. The share of total euro area government debt held by non-residents (including residents of other euro area countries) stood at about 51.2% in 2011, a slight decline from 52.5% in 2010. However, the share of public debt held by non-residents in 2011 varied greatly across countries, ranging from roughly 4.5% to 78.6%.³

To a certain extent, government financing needs could be attenuated through recourse to selected existing financial assets of the government. Such assets, the degree of liquidity of which varies, include mainly currency and deposits, loans granted by the government, securities other than shares, shares and other equity, and other accounts receivable. At the end of 2011, the average amount of consolidated financial assets held by euro area governments stood at 33.6% of GDP, with some variation across countries. The market value of consolidated government liabilities

Chart 2.17 Estimated financing needs of the euro area countries in 2012

(2012; percentage of GDP)



Sources: European Commission Spring 2012 economic forecast, ECB and ECB calculations.³

Euro area governments' gross financing needs are expected to decline slightly in 2012, but remain sizeable in some countries...

...and a large proportion of government debt is up for refinancing within the next two years...

...but this could in some cases be attenuated through sales of financial assets

³ The gross financing needs for 2012 are broad estimates consisting of the redemption of all debt maturing in 2012 (both already redeemed and still outstanding debt at end-March 2012) and the government deficit (assuming no additional financial operations "below the line"). The estimates are subject to the following caveats. First, they only take into account redemptions of securities, while maturing loans (e.g. from domestic banks) are not included on account of a lack of data (this may lead to underestimation). Second, some government securities do not fall into the definition used in the European System of Accounts 1995 (ESA 95) for general government debt (which might lead to overestimation). However, in order to provide more accurate estimates in the case of Cyprus, the above chart excludes the special-purpose bond of €2.8 billion (15.4% of GDP) issued with the aim of improving the liquidity of the banking sector. This bond matures in November 2012 and is expected to be paid back by banks and not to be rolled over by the government. Third, estimates do not take account of the fact that some maturing government securities are held within the government sector. Finally, refinancing needs corresponding to short-term debt issued after March 2012 are not reflected in the 2012 data. The redemption values for Greece reflect the impact of the debt exchange in the context of PSI realised until end-March 2012 (€183 billion), whereas the up-front repayment in the context of the bond exchange and bank recapitalisation needs (the former fully and the latter mainly in the form of EFSF bonds) are not included in the financing needs as they will represent a need to raise funding in the market only once the EFSF bonds expire.

at the time was 91.9% of GDP. Accordingly, the net debt of euro area governments (liabilities of the governments minus financial assets held, both recorded at market value) totalled 58.3% of GDP at the end of 2011. Overall, the feasibility of using government financial assets as a means of temporally smoothing governments' financing needs – and the associated role that such assets can play in reducing funding risks relevant for financial stability – depends on their liquidity and marketability. The latter may arguably be lower in times of crisis. Moreover, government holdings of financial assets – and not only gross government liabilities – can be relevant for assessing sovereign debt sustainability over the medium term, when a larger part of the financial assets could potentially be mobilised.



III THE FINANCIAL SYSTEM

3 FINANCIAL MARKETS AND GLOBAL FINANCIAL INSTITUTIONS

The announcement and allotment by the Eurosystem of two three-year longer-term refinancing operations (LTROs) was critical in boosting confidence in money markets, as well as in debt and equity markets. Reduced liquidity risk for the euro area banking sector coincided with a fall in implied volatility in sovereign bond markets, while the corporate sector has benefited from stronger investor interest and a favourable funding environment. Some of this improved sentiment appears to have been transitory, however: after a broad-based rally, financial sector equity investors, in particular, have corrected their positive initial risk assessment since the middle of March 2012.

Global large and complex banking groups (LCBGs) have generally benefited from an improvement in market sentiment in early 2012. At the same time, subdued revenue expectations, along with little adjustment in operating expenditure, weigh on future profitability. In early 2012 the investment performance of hedge funds recovered and funding liquidity pressures appeared to be contained, while the use of financial leverage remained moderate.

3.1 CONTINUING TENSIONS IN MONEY AND CAPITAL MARKETS

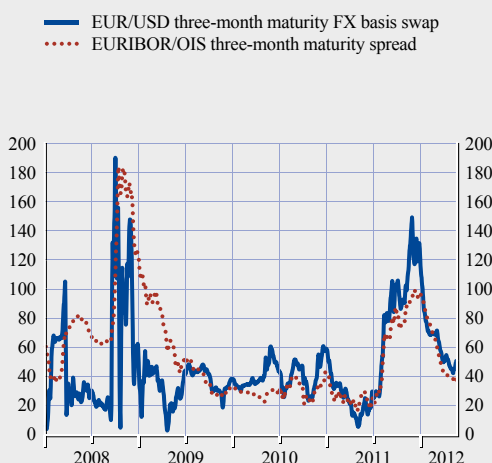
MONEY MARKETS

Tensions in the euro area money market – which had reached high levels towards the end of 2011 – subsided following the rapid unwinding which accompanied the announcement and, in particular, the subsequent allotment of the Eurosystem's two three-year LTROs (see Charts 3.1 and S.4.1 and Box 4). Taken together, the two operations, allotting €489 billion to 523 credit institutions on 21 December 2011 and €530 billion to 800 credit institutions on 29 February 2012, resulted in a net liquidity injection of €521 billion given the operations maturing in the weeks of the allotment of these LTROs. The broadened participation, in particular for the second operation, implied bids by smaller banks participating for relatively small amounts, providing key support for the smaller institutions that are crucial for the financing of euro area small and medium-sized enterprises.

Some continued tensions in money markets following three-year LTROs...

Chart 3.1 EURIBOR/OIS spread and the EUR/USD basis swap

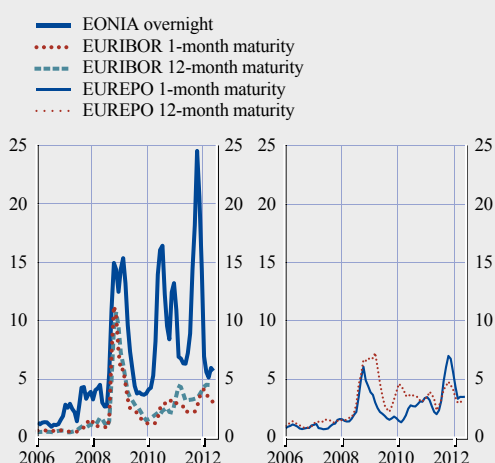
(Jan. 2008 – May 2012; basis points)



Sources: European Banking Federation and Bloomberg.

Chart 3.2 Cross-country standard deviation of average unsecured lending and repo rates

(Jan. 2006 – May 2012; basis points; two-month moving average)



Sources: European Banking Federation and ECB calculations.

... with lower liquidity and perceived counterparty risk...

... but activity in the unsecured market is still subdued...

... albeit amid some easing in segmentation

The two three-year LTROs mitigated liquidity risk and thereby supported market sentiment across money market segments. While some of these effects may prove to be temporary, they provided timely and critical support to lower both liquidity and perceived counterparty risk in the euro money market. Perhaps most notably, EURIBOR/OIS spreads reversed their widening trend from last year and tightened substantially (see Chart 3.1). At the same time, there is still some divergence between unsecured money market interest rates and the interbank offered rates provided by banks (see Chart 3.2).¹

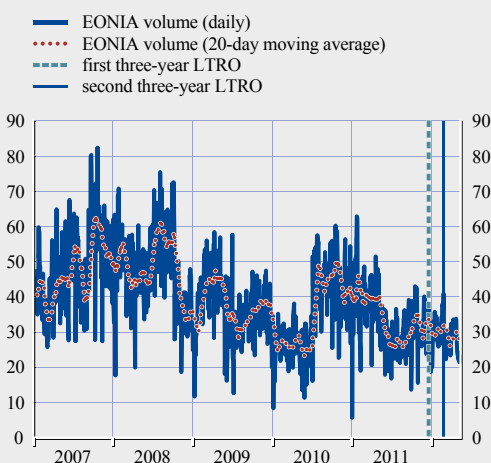
Notwithstanding some improvement, overall activity in money markets, in particular in the unsecured segment, has remained relatively subdued (see Chart 3.3). This lower activity level appears to reflect a broader structural shift in money market activity towards the secured market since the beginning of the financial crisis. Most recently, volumes in the unsecured market have come down slightly after the allotment of the three-year LTROs, whereby current EONIA volumes have declined to a daily turnover of around €25 billion. Outside the overnight segment, turnover has remained very limited.

In the secured money market segment, the two three-year LTROs have contributed to reducing the market segmentation which had intensified in the second half of 2011 as a result of the sovereign debt crisis (see also Section 4.3.1). Perhaps representative in this respect was a decline in the spread between the “core” country collateral rates and rates based on Italian as well as Spanish government bond collateral. Indeed, there was an extremely sharp reversal after the first three-year operation of the progressively rising trend observed in the latter half of 2011, indicating that the funding of Italian and Spanish government bond positions in the repo market has become much cheaper (see Chart 3.4). Despite the temporary reversal in price developments, the relative scarcity of collateral and collateral margining requirements have, among other factors, contributed to relatively subdued interbank activity in the repo market.

1 According to the EURIBOR Technical Features, a “representative panel of banks provide daily quotes of the rate, rounded to three decimal places, that each panel bank believes one prime bank is quoting to another prime bank for interbank term deposits within the euro zone” (see http://www.euribor-ebf.eu/assets/files/Euribor_tech_features.pdf).

Chart 3.3 EONIA volumes

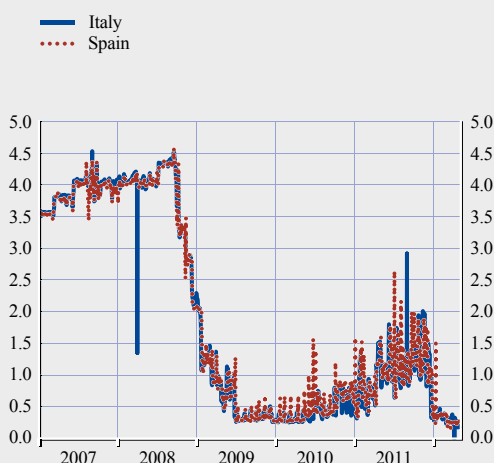
(Jan. 2011 – May 2012; EUR billions)



Source: ECB.

Chart 3.4 Italian and Spanish overnight repo market rates

(Jan. 2007 – May 2012; percentages)



Sources: MTS and Banco de España.

This aggregate improvement was also evident at longer money market maturities – with a notable rise in the outstanding amounts of short-term European paper (STEP) issued by euro area monetary financial institutions. Outstanding amounts for all maturities reached a level of approximately €400 billion in March 2012 (€382 billion as of mid-May 2012), the highest since May 2010. More specifically, for the “longer” maturities of this segment, activity has picked up in relative terms, with amounts outstanding for the 101-200 day and the 201-366 day segments doubling to €76 billion and €52 billion, respectively, in the first few months of 2012.

Similar to the euro money market, liquidity remains abundant in the US dollar money market. The ECB’s non-standard policy measures, including the prolongation of swap lines with the Federal Reserve at reduced pricing (which serves as an effective backstop facility), have improved market conditions for euro area banks in accessing US dollar liquidity since the end of 2011 (see also Section 4.1). This is most visible in the significant decline of EUR/USD basis swap rates (see Chart 3.1), as well as the continuous gradual decline in the USD LIBOR rates and in spreads with overnight index swap (OIS) rates.

Box 4

ASSESSING STRESS IN INTERBANK MONEY MARKETS AND THE ROLE OF UNCONVENTIONAL MONETARY POLICY MEASURES

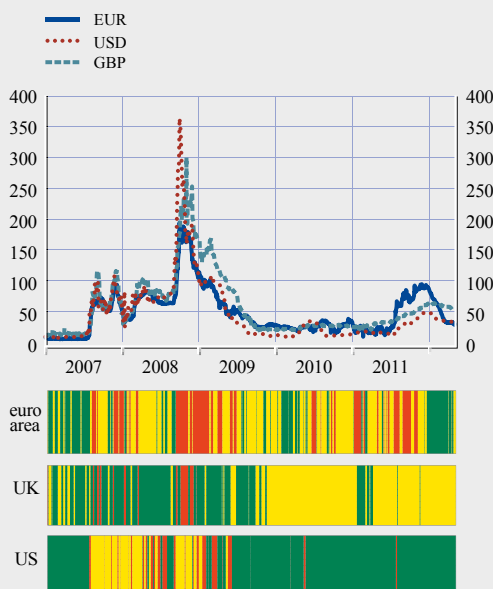
Interbank money markets have exhibited intermittent stress since the onset of the financial turmoil in mid-2007 – tensions at times extreme, reflecting both counterparty and liquidity risk. Central bank policy measures, and in particular extraordinary non-standard ones, have made a strong contribution to stemming liquidity-related pressures in interbank markets. This box presents a means of measuring the intensity of such pressures, and thus the unwillingness of banks to grant unsecured loans. It then focuses on conditions over recent months in the euro money market and in particular the impact of the Eurosystem’s three-year LTROs announced in December 2011, or more specifically an estimate of how stress may have evolved in the *absence* of this policy measure.

The analysis is based on a frequently used measure of interbank market stress, that is, the spread between unsecured interbank money market rates (the London interbank offered rate, or LIBOR, as a proxy) and a corresponding measure for a risk-free interest rate (here the overnight index swap (OIS) rate). This spread is allowed to traverse a number of regimes, affiliation to which is expressed by means of probabilities that are estimated by a Markov-switching model.¹ Chart A visualises the resulting probabilities in the form of a heat map for the euro, pound sterling and US dollar markets. It illustrates that intermittent periods of strong funding stress appear to have characterised the euro money market during the escalation of sovereign tensions (and in particular over much of 2011), in contrast to relative stability – albeit not free of stress entirely – in other major money markets. It is particularly noteworthy that, following the announcement of the Eurosystem’s three-year LTROs in late 2011, tensions clearly eased in the euro money market.

¹ Specification tests suggest that three regimes should be set, as the model dynamics (i.e. coefficients) are different to conventional levels of significance across all three regimes.

Chart A Funding conditions in interbank money markets

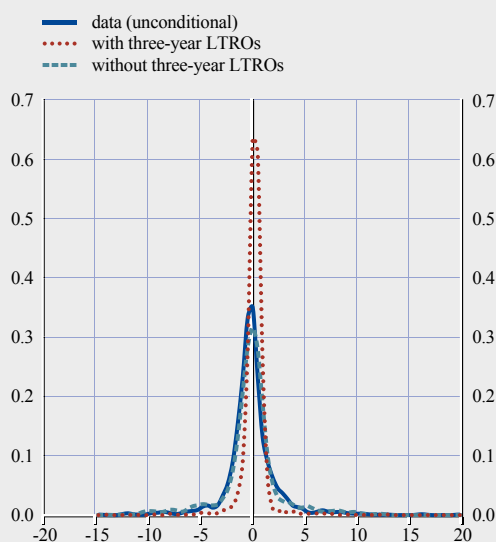
(Jan. 2007 – May 2012; basis points; three-month LIBOR/OIS spread)



Sources: Bloomberg and ECB calculations.
Note: Red indicator points to rising, yellow to moderating and green to falling pressure in the respective markets.

Chart B Kernel density distributions conditional on the three-year LTROs

(y-axis: density; x-axis: three-month LIBOR/OIS spread in basis points)



Sources: Bloomberg and ECB calculations.
Note: Based on a simulated path (stochastic simulation for 10,000 days) from the regime-switching model with a LTRO-dependent transition matrix.

The model is then used to conduct a series of counterfactual simulations to assess the role played by the anticipation of unconventional policy action in the euro area, in this case the Eurosystem's three-year LTRO announcement of December 2011. Specifically, making the model-inferred transition probabilities between regimes a function of this specific policy measure provides an assessment of the extent to which it has contributed to more stable funding conditions in the euro money market.² The model set-up is used to simulate artificial market data under the counterfactual assumption of the three-year LTROs having been versus not having been conducted.

2 Technically, this conditioning is accomplished by introducing a binary dummy to the otherwise conventional first-order Markov-chain process, with the dummy marking the announcement date of the three-year LTROs on 8 December 2011.

Long-run regime probabilities and distributional statistics of the LIBOR/OIS spread as a function of three-year LTROs

		Overall spread		Liquidity		Credit	
		LTRO=OFF	LTRO=ON	LTRO=OFF	LTRO=ON	LTRO=OFF	LTRO=ON
Long-run probabilities	Rising	30%	6%	26%	12%	35%	56%
	Flat	53%	16%	35%	17%	35%	41%
	Falling	17%	78%	39%	71%	10%	3%
Distributional statistics	Mean	0.05	-0.30	0.01	-0.16	0.02	0.02
	STDEV	2.78	1.09	2.59	1.46	1.16	1.41
	Skew	0.06	2.79	0.07	-0.01	0.01	-0.07
	IQ range	1.65	0.68	2.07	1.97	0.76	1.13

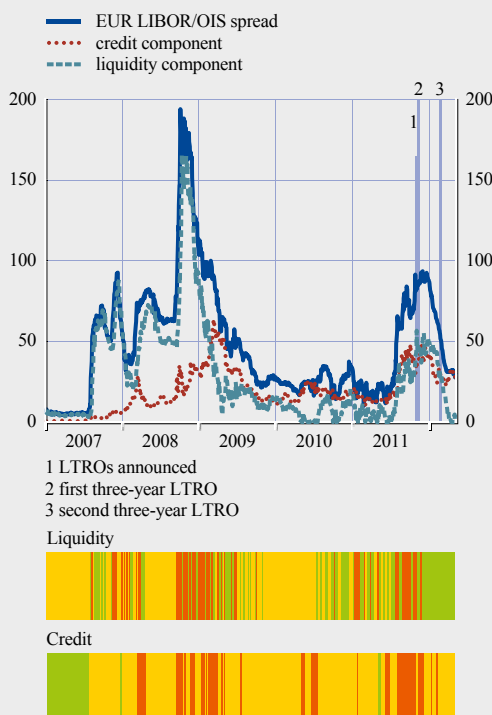
LTRO-conditional regime-switching probabilities, as well as summary statistics for the distributions of the simulated euro market spreads, are summarised in the table above. For the overall spread, the underlying simulated distributions are plotted in Chart B. In addition, the overall spread has been decomposed into its credit and liquidity components and the counterfactual simulations have been run on them separately (see Chart C).³

The long-run weight (probability) associated with the falling pressure regime increases significantly upon conditioning on the three-year LTRO. The distributional statistics suggest that it was able to compress the spread and reduce the volatility in euro money markets substantially, with the reduction in the standard deviation equalling about 54%.

The analysis in this box suggests that the three-year LTROs led to a significant reduction of the stress that had characterised the euro money market over much of 2011. The impact was, according to the estimates, primarily achieved via a compression of the LIBOR/OIS spread's liquidity component.

Chart C Decomposition of the three-month euro LIBOR/OIS spread and related heat maps

(Jan. 2007 – May 2012; basis points)



Sources: Bloomberg and ECB calculations.
Note: Red indicator points to rising, yellow to moderating and green to falling pressure on the respective spreads.

3 The decomposition entails two steps: (i) for the LIBOR panel of banks, one-year credit default swap spreads are scaled to the three-month horizon and then used to infer risk-neutral probabilities of default (PDs) under the assumption of 60% losses given default (LGDs); (ii) an average across the panel is assumed to proxy the credit premium, and the remaining spread to the LIBOR minus a measure of the risk-free rate (here the OIS) is assumed to reflect all non-credit factors, including a premium associated with liquidity risk. A number of caveats of this methodology are discussed e.g. in Bank of England, *Quarterly Bulletin*, 2007 (see also the references therein) and F. Heider, M. Hoerova and C. Holthausen, "Liquidity hoarding and interbank market spreads: the role of counterparty risk", *ECB Working Paper Series*, No 1126, 2009.

GOVERNMENT BOND MARKETS

Government bond markets have been subject to continued tensions since the end of last year, most notably in countries under sovereign stress (see Chart 3.5). In this context, market preferences for assets perceived to be both liquid and safe have continued to prevail. This has led to some segmentation in the euro area government bond market – whereby subdued yields in some jurisdictions as part of a flight to safety have contrasted with relatively high yields in others where concerns linger on factors ranging from political uncertainty to the interaction of sovereign and financial sector fragilities.

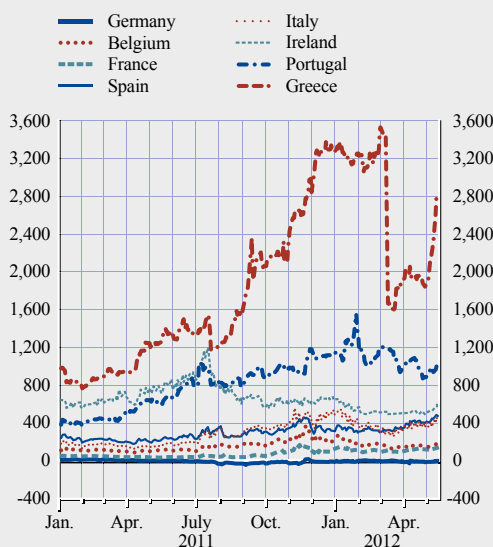
Notwithstanding this volatility in yields, aggregate sovereign bond market uncertainties in the euro area have decreased substantially since late 2011 to reach levels similar to those observed in the United States (see Chart 3.7). Two factors appear to have contributed to this decline.

*Continued tensions
in euro area
government bond
markets...*

*... albeit amid
abating implied
volatility ...*

Chart 3.5 Spread between ten-year euro area sovereign bond yields and the ten-year overnight index swap

(Jan. 2011 – May 2012; basis points)

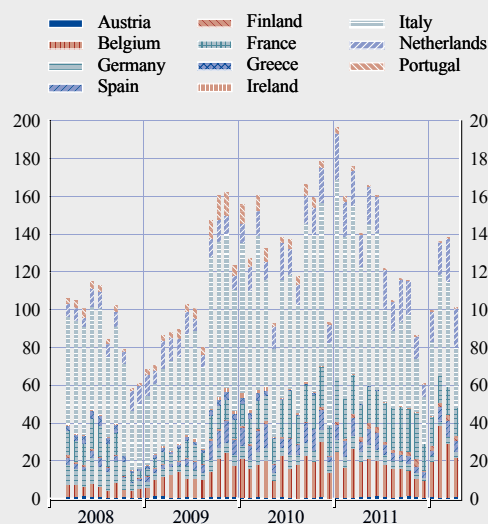


Sources: Bloomberg and ECB calculations.

Note: The euro overnight index swap rate, rather than German government bond yields, was used in order to account for the impact of flight-to-safety flows into German government bonds.

Chart 3.6 Traded volumes of euro area sovereign bonds on the MTS platform

(Mar. 2008 – Apr. 2012; EUR billions)



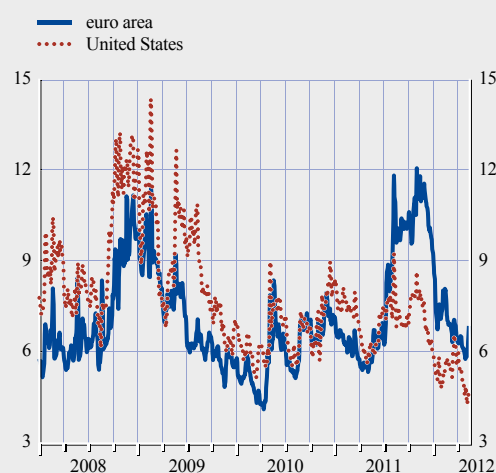
Source: MTS.

First, the Eurosystem's two three-year LTROs not only played a significant role in alleviating funding strains in the financial sector, but also provided broader support to market confidence (see Box 5), including in the sovereign bond market. This latter effect was most pronounced in early 2012, when overall volumes rebounded from a level comparable to the period around the Lehman Brothers episode, near to levels reached in early 2010 (see Chart 3.6). Second, there has been progress with several political initiatives including, in particular, an agreement on the so-called "fiscal compact" and strengthened euro area firewalls. In addition to this, the triggering of Greek sovereign credit default swaps (CDSs) in the context of the Greek debt exchange was viewed by many commentators as a needed validation of this hedging tool more generally for sovereign exposure.

Notwithstanding this decline in implied market volatility, euro area government bond market sentiment remains fragile. This has been most

Chart 3.7 Implied bond market volatility in the euro area and the United States

(Jan. 2008 – May 2012; percentages; three-day moving average)



Source: Bloomberg.

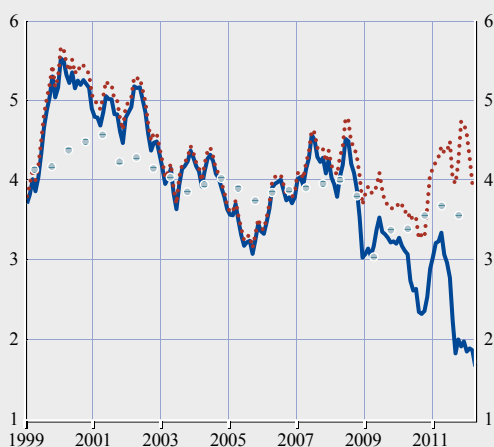
Notes: Implied government bond volatility is a measure of uncertainty over the short term (up to three months) for German and US ten-year government bond prices. It is based on the market values or related traded options contracts. Bloomberg uses implied volatility of the closest to at-the-money strikes for both puts and calls using near-month expiry futures.

... while sentiment remains fragile

Chart 3.8 Euro area long-term government bond yield and nominal GDP growth expectations

(Jan. 1999 – May 2012; percentages)

- ten-year bond yield (Germany)
- ... ten-year bond yield (euro area, GDP weighted)
- consensus nominal GDP growth average one to ten years ahead

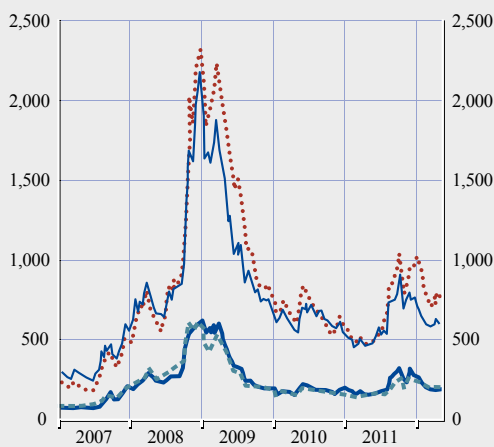


Sources: Thomson Reuters Datastream, Consensus Economics and ECB calculations

Chart 3.9 Corporate bond spreads in the euro area and the United States

(Jan. 2007 – May 2012; basis points)

- euro area A-rated
- ... euro area speculative-grade-rated
- US A-rated
- US speculative-grade-rated



Source: Bank of America Merrill Lynch.

Note: Option-adjusted spreads of corporate bond indices (average maturity of six to ten years).

clearly demonstrated by some renewed sovereign bond market tensions since April 2012 on account of political uncertainty twinned with concerns about financial sector health in specific entities and jurisdictions. These factors have led to some renewal in the climate of risk aversion – though government bond yields in countries under stress have generally remained below the peaks witnessed at the end of 2011. Moreover, risks related to underlying macroeconomic prospects appear to have been progressively priced into bonds (see Chart 3.8). This, in turn, has muted the immediate impact of sovereign rating downgrade decisions – most evident in the sovereign downgrades in early 2012, which did not trigger strong initial market reactions.

CREDIT MARKETS

A search for euro area investment opportunities by market participants in an environment of incipient returning risk appetite is likely to have contributed to the observed narrowing of corporate credit spreads in both the high-yield and high-rated segments over the last six months (see Chart 3.9 and S.3.1).

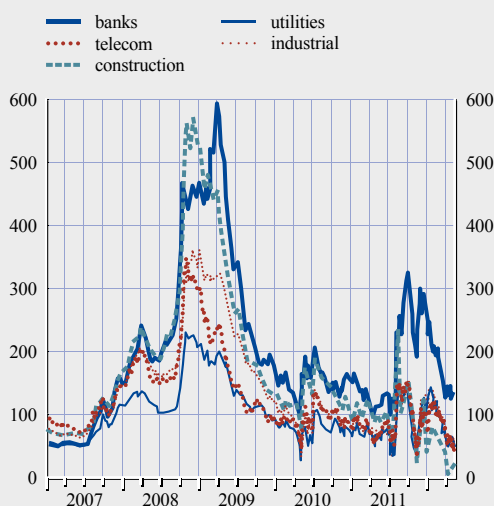
The general credit spread reduction across all corporate sectors was most significant for the banking sector, with spreads falling by half from a peak of over 300 basis points in late November 2011 in the weeks following the implementation of the three-year LTROs (see Chart 3.10). In parallel, the highly rated corporate bond spreads in the euro area reached a level comparable to their equivalents in the United States.

Liquidity inflow into credit markets...

... providing the corporate sector with a favourable funding environment

Chart 3.10 Corporate bond spreads for selected sectors in the euro area

(Jan. 2007 – May 2012; basis points)



Source: iBoxx.

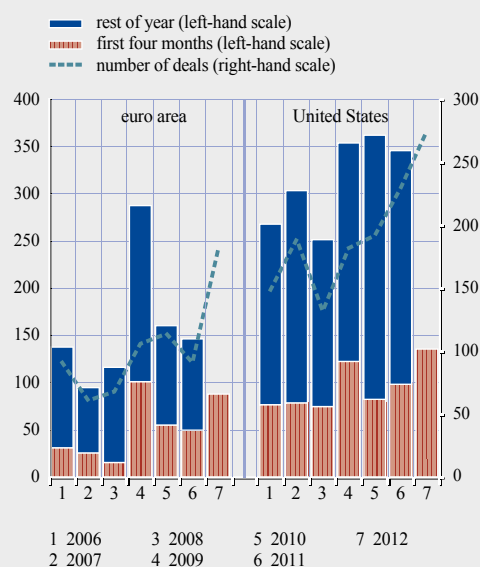
Market participants appear to have dissociated the risk assessments for sovereign and corporate issuers, as sovereign CDS and corporate spreads have been barely correlated over recent months. In this context, investors appear even to have judged that corporate yields observed in the market are higher for a comparable level of credit risk (see Box 3 in Section 2). Indeed, the latest information on corporate bond issuance tends to confirm a rise over the first four months of 2012. This increase was more pronounced in the euro area than in the United States, with the number of deals having almost doubled compared with the same period in 2011 (see Chart 3.11).

EQUITY MARKETS

While equity markets rallied strongly in the euro area and also in the United States from December 2011 to mid-March 2012, a correction has been evident since then, affecting the euro area financial sector in particular (see Chart 3.12). The surge in the early part of the year appears to have stemmed from the Eurosystem's three-year LTROs, which strongly influenced market

Chart 3.11 Bond issuance by non-financial corporations (all rating classes)

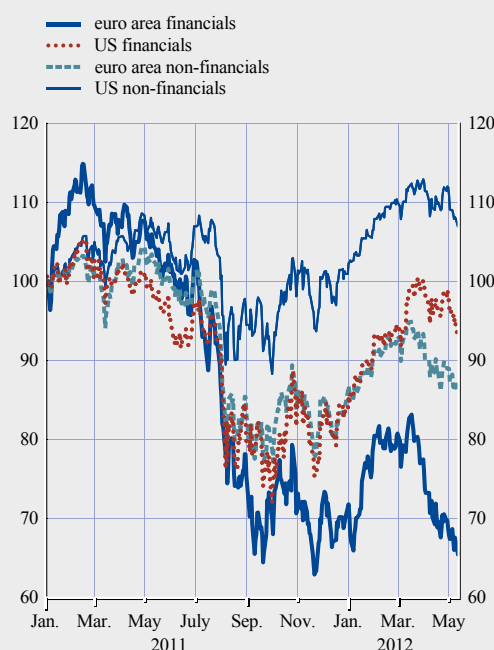
(Jan. 2006 – Apr. 2012; issuance in EUR billions and number of deals)



Sources: Dealogic and ECB calculations.

Chart 3.12 Equity price developments for financial and non-financial stocks in the euro area and the United States

(Jan. 2011 – May 2012; index: Jan. 2011 = 100)

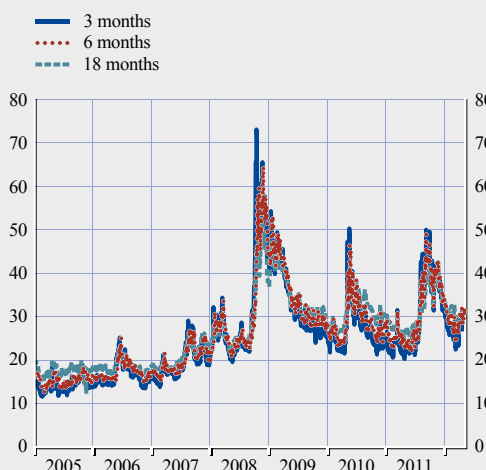


Source: Thomson Reuters.

sentiment - not only through the easing of funding constraints on the banking sector but also as part of a broader confidence shock. These effects, however, appear to have dissipated in recent months amidst rising risk aversion. Stock market volatility has mirrored these developments, decreasing substantially in early 2012 and having picked up since late March 2012 (see Chart 3.13). Implied stock market distributions have also reflected the described trends in market sentiment: tail risks decreased initially at the beginning of 2012, uncertainty (as measured by implied volatility) diminished and negative asymmetries decreased, pointing to a change in market participants' views towards a more balanced risk assessment in terms of expected factors shaping the positive and/or negative sides of returns distributions (see Box 5). This is confirmed by the fact that the term structure of implied volatility returned to a configuration of uncertainty increasing with the time horizons associated with normal times (see Chart 3.13). Latest data point to increased risk aversion, while volatility remains clearly below the levels seen at the peak of crisis episodes.

Chart 3.13 Implied volatility for the euro area stock market at different horizons

(Jan. 2005 – May 2012; percentages)



Source: Thomson Reuters.

*... with risk
assessments
becoming more
balanced*

Box 5

THE IMPACT OF THE LONGER-TERM REFINANCING OPERATIONS ON MONEY MARKET OPTIONS

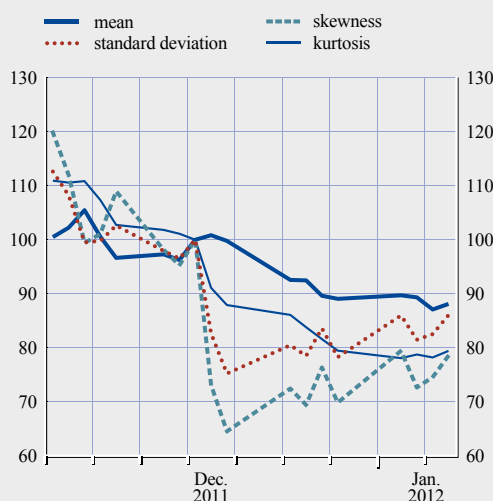
The Eurosystem's December 2011 and February 2012 three-year longer-term refinancing operations (LTROs) targeted deficiencies in bank term funding markets, and were instrumental in preventing a credit crunch that could have compromised the maintenance of price stability in the euro area. Notwithstanding the clear and targeted objective of this policy action, it appears to have reverberated well beyond the banking system and into the broad financial system. This, in turn, appears to have stemmed from its inherent boost to market confidence, and more specifically its effect of removing the distributional "tail risk" of an extreme event occurring in the economic and financial environment.

This box focuses on the measurement of such tail risk and uncertainty. Positive confidence shocks, such as the one linked to the LTROs, are expected to be reflected in risk-implied probability densities extracted from option prices, as such data embody market participant expectations.¹ To understand the extent to which the most recent non-standard measures (the three-year LTROs) have had an impact on market confidence, first the statistical moments of the implied

¹ For a detailed description of the implied distribution methodology applied by the ECB, see J.M. Puigvert-Gutiérrez and R. de Vincent-Humphreys, "A Quantitative Mirror On The Euribor Market Using Implied Probability Density Functions", *Eurasian Economic Review*, 2(1), 2012.

Chart A EURIBOR three-month implied probability distribution moments around the first LTRO

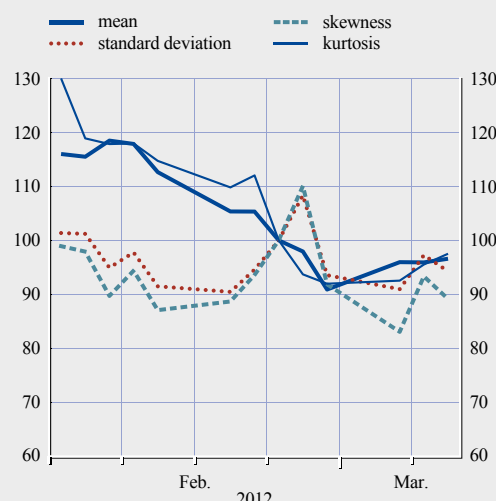
(index: 21 December 2011 = 100)



Sources: Bloomberg and ECB calculations.

Chart B EURIBOR three-month implied probability distribution moments around the second LTRO

(index: 29 February 2012 = 100)



Sources: Bloomberg and ECB calculations.

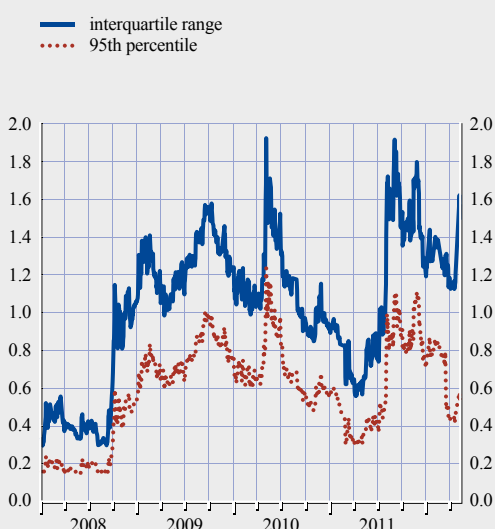
distributions for the three-month EURIBOR around the two LTROs and subsequently the time series of two implied distribution characteristics are analysed. To begin with, the focus is on tail risk, i.e. the probability of an event far away from average expectations. Practically, this implies examining an extreme quantile of the option-implied risk/return probability distribution – calibrated here to be the 5% or 95% quantile. Second, such analysis is complemented with a measure of uncertainty, or a measure of how spread out the distribution of market expectations is from the mean. This again implies in practical terms an examination of the interquantile range of the option-implied risk/return probability distribution – calibrated here to be the mass of the distribution falling between the 95% and 5% quantile.

Charts A and B show the behaviour of the statistical moments of the EURIBOR three-month probability distributions around the LTRO dates. A decrease of the skewness indicates a tendency for market participants to expect future interest rates to be below the mean rather than above it; the lower kurtosis suggests that the likelihood that market participants attach to more extreme outcomes compared with outcomes at the centre of the density has declined. This is especially evident after the first LTRO, but seems to be less pronounced for the second LTRO.

The above analysis of a changing distribution over time is corroborated by a more detailed view of the dynamics of specific segments of the return distributions (see Charts C and D). For both markets (upper tail risk for the money market and lower tail risk for the equity market), three distinct periods of tension can be identified as having given rise to significant tail risk and uncertainty. First, the failure of Lehman Brothers in September 2008 was followed by heightened tail risks: market participants priced with a risk of 5% a positive 60 basis point jump in the EURIBOR and decreases by 52% and 45% for the Dow Jones EURO STOXX 50 index and the Dow Jones EURO STOXX bank index, respectively, in the subsequent three months. These jumps in tail risk were associated with a broader interquantile range, thus more uncertainty. A second period of tensions appeared in May 2010, associated with the initial stages of the euro area

Chart C EURIBOR: extreme quantile and interquartile range

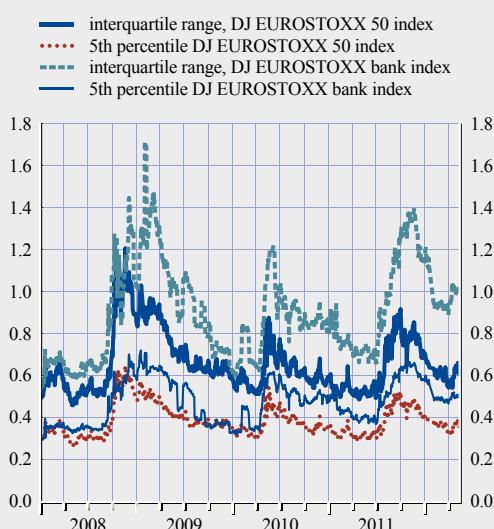
(Jan. 2008 – May 2012)



Sources: Bloomberg and ECB calculations.

Chart D Stock markets: extreme quantile and interquartile range

(Jan. 2008 – May 2012)



Sources: Bloomberg and ECB calculations.

sovereign debt crisis. While this led to an initial spike in tail risk and uncertainty, this quickly dissipated in the context of a relatively positively perceived economic outlook, along with policy actions (such as the ECB's non-standard measures and measures announced by European governments). Such improvements in tail risk and uncertainty came to a sudden halt in July 2011, when the tail risk and uncertainty associated with EURIBOR rose back to its May 2010 level, while the stock market tail risk and uncertainty were close to levels right after the failure of Lehman Brothers. Most recently, the first three-year LTRO at the end of December 2011 appears to have been a turning point for both markets, with lower tensions, even though the level of each indicator was still high and it remains to be seen whether their decrease will be confirmed in the coming months: the most recent increase in these indicators shows that financial market risks can still be sharply and quickly reassessed by market participants.

All in all, implied distributions drawn from options on European money and equity markets suggest a decisive recent role played by policy action in curbing the risk of extreme events and, more generally, uncertainty. Their historical evolution suggests, however, that such impacts can be short-lived – which in the current context implies a strong need for concrete action on the part of governments and banks following the Eurosystem's three-year LTROs to secure a lasting improvement in economic and financial fundamentals.

3.2 SUBDUED REVENUE PROSPECTS FOR GLOBAL FINANCIAL INSTITUTIONS

GLOBAL LARGE AND COMPLEX BANKING GROUPS²

Sentiment towards global LCBGs generally improved at the beginning of this year, mirroring the improvements witnessed in their euro area counterparts. Factors driving this improved sentiment included some greater optimism, albeit guarded, concerning global and in particular US macroeconomic prospects, as well as spillovers from policy action in Europe, notably the three-year LTROs and their implications of reduced counterparty risks for global banks.

At the same time, the operating environment of the main global LCBGs, which include banks in the United States, the United Kingdom and Switzerland, has nonetheless remained challenging. In particular, those banks with legacy exposures to real estate price corrections may still be subject to credit risks, while ongoing regulatory reforms aimed at strengthening the financial system are frequently cited by market participants as potentially weighing on performance. The same factors that have affected profitability in recent quarters are expected to also strongly influence the outlook for global LCBGs – namely, counterparty risk perceptions, credit risk stemming from exposures to continuing real estate corrections, and a changing regulatory environment.

Financial soundness of global large and complex banking groups

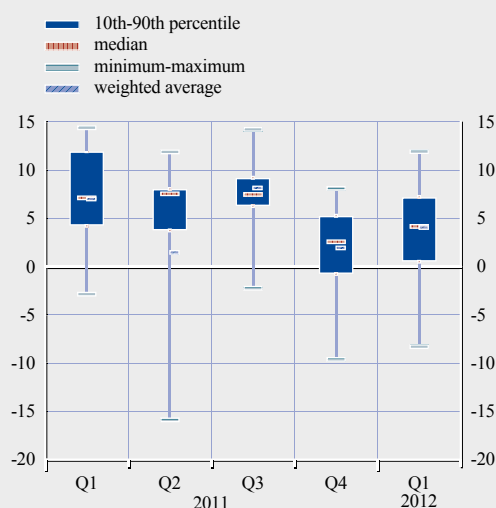
Profitability has declined

The profitability of global LCBGs decreased substantially in the fourth quarter of 2011, albeit with varied performance across institutions. Although return on equity slightly improved in the first quarter of this year, it is still below the level observed at the beginning of last year (see Chart 3.14). In the United States, weakening profitability was related to higher market volatility driven by European developments which hampered the banks' fee businesses. In the United Kingdom, escalating tensions in the euro area in late 2011 spilled over to some extent, while overall income was hit by higher impairments on loans to countries still suffering from crisis-related property market corrections. Furthermore, all UK banks considered suffered some losses from mis-sold payment protection insurance. Swiss banks, in contrast to their international peers, underperformed owing to the restructuring of their business models through the disposal of risk-weighted assets in an environment of relatively depressed market prices.

The aggregate developments in profitability across all global LCBGs towards the end of 2011 appear to have been strongly influenced by a fall in trading income related to the intensification

Chart 3.14 Return on shareholders' equity for global large and complex banking groups

(Q1 2011 – Q1 2012; percentages)

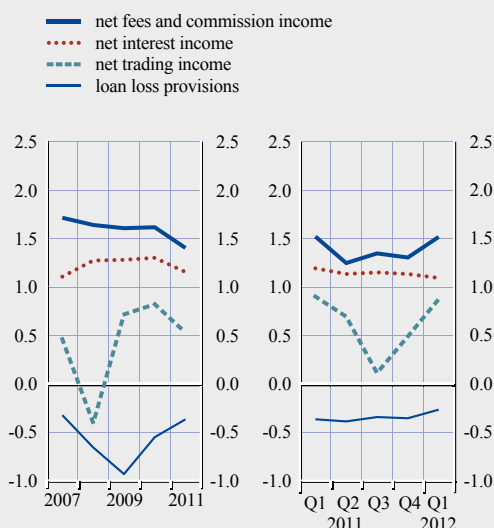


Sources: Individual banks' reports and ECB calculations.
Notes: Quarterly ratios are based on available data for a sub-sample of LCBGs for which results for all quarters are available. Quarterly results have been annualised.

² For a discussion on how global LCBGs are identified, see Box 10 in ECB, *Financial Stability Review*, December 2007. The institutions included in the analysis presented here are Bank of America, Bank of New York Mellon, Barclays, Citigroup, Credit Suisse, Goldman Sachs, HSBC, JP Morgan Chase & Co., Lloyds Banking Group, Morgan Stanley, Royal Bank of Scotland, State Street and UBS. However, not all figures were available for all companies.

Chart 3.15 Decomposition of the operating income and loan loss provisions for global large and complex banking groups

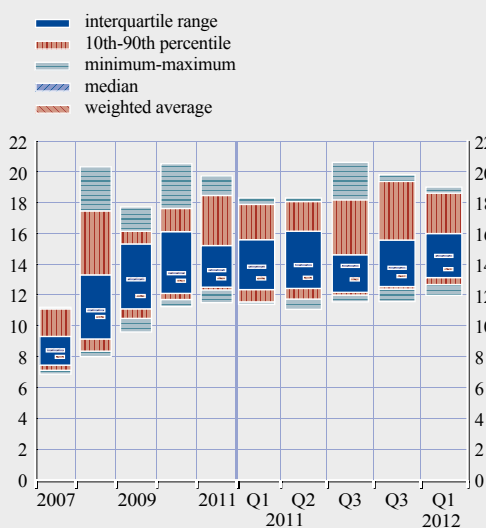
(2007 – Q1 2012; percentages)



Sources: Individual banks' reports and ECB calculations.
Notes: Quarterly ratios are based on available data for a sub-sample of LCBGs for which results for all quarters are available. Quarterly results have been annualised.

Chart 3.16 Tier I capital ratios of global large and complex banking groups

(2007 – Q1 2012; percentages)



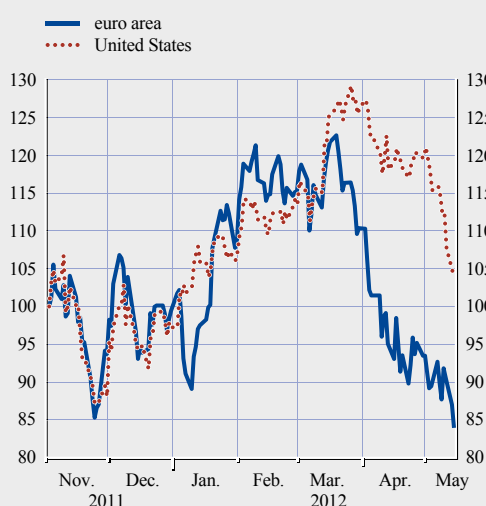
Sources: Individual banks' reports and ECB calculations.
Notes: Quarterly ratios are based on available data for a sub-sample of LCBGs for which results for all quarters are available. Quarterly results have been annualised.

of euro area sovereign strains. In the first quarter of this year trading income rebounded. Net fee and commission income continued to suffer at the end of 2011 from lower activity in mergers and acquisitions, lower transaction volumes and lower levels of client activities, but recovered somewhat in the first quarter of 2012 (see Chart 3.15). Net interest income, by contrast, remained broadly stable. Consequently, cost-cutting might become a major theme in 2012. However, so far, no significant expense cuts have been observed. On the contrary, in the fourth quarter of 2011 the weighted average of operating expenses even increased.

The Tier 1 capital ratios of global LCBGs remained broadly unchanged throughout last year and in the first quarter of 2012 (see Chart 3.16). At the beginning of this year, attention shifted to regulators' assessments of capital needs – including those in the United States and the United Kingdom. In the United States, the Federal Reserve's stress test of 19 US banks – the so-called Comprehensive Capital Analysis and Review (CCAR) – included an approval of most banks' capital plans, and was generally interpreted as indicative of sound balance sheets and robust capital. Market

Chart 3.17 Stock prices of US and euro area large and complex banking groups

(Nov. 2011 – May 2012; index: Nov. 2011 = 100)



Sources: Bloomberg and ECB calculations.

*Capital buffers
remain unchanged*

Spillovers from equity price developments among global LCBGs

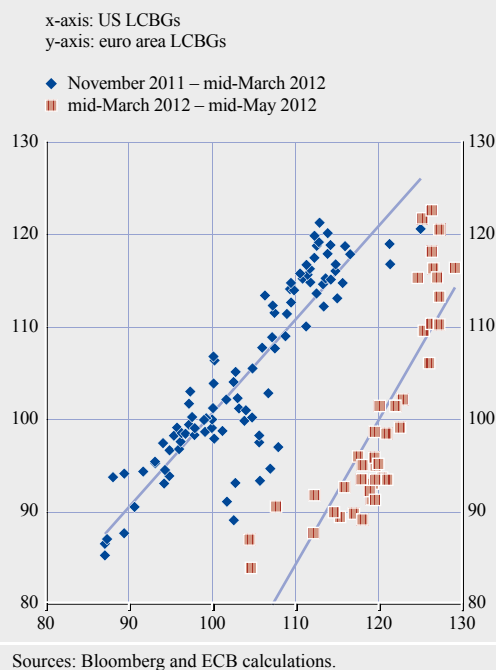
reaction to the publication of results in mid-March 2012 was very favourable, as reflected in strong share price performance (see Chart 3.17). Regulators in the United Kingdom, by contrast, asked banks to raise more capital, as they remained concerned that capital was not yet at levels that would ensure resilience in the face of prospective risks.

This evolution of fundamentals was associated with a significant improvement in the stock prices of global LCBGs in early 2012, with US banks leading the way (see Chart 3.17). Indeed, the observed developments during this period appear to correspond to historical patterns whereby equity prices for US LCBGs exhibit leading indicator properties for their European counterparts. This relationship between the share prices of US and euro area LCBGs can also be analysed more formally based on statistical tests in connection with an empirical model using a co-integrated VAR model that is estimated based on daily data for aggregated share prices of euro area and US LCBGs as well as the USD/EUR exchange rate. The results of these tests imply that past movements in stock prices of US LCBGs are closely linked to future movements in euro area LCBGs, whereas the converse is not true.

Since mid-March, however, the share prices of euro area LCBGs witnessed more pronounced declines compared with those of US LCBGs. This could be explained by a deterioration in the euro area economic outlook at that time, with associated sudden negative impacts on the banks' earnings outlook, as well as the resurgence in sovereign stress in the euro area. Nevertheless, the tight correlation between US and euro area share prices remains intact, which is reflected by the two trend lines in Chart 3.18.

Chart 3.18 Relationship between stock prices of US and euro area large and complex banking groups

(Nov. 2011 – May 2012; index: Nov. 2011 = 100; daily observations)



HEDGE FUNDS

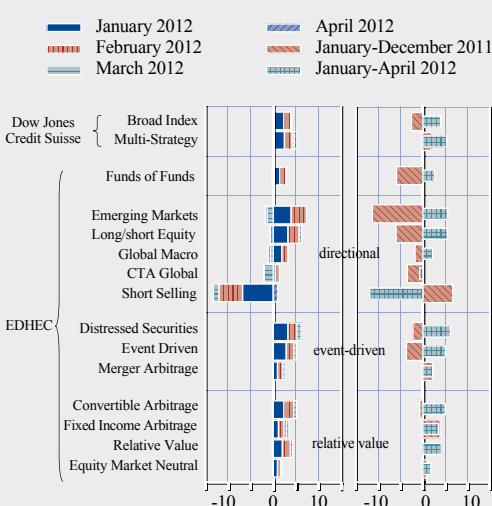
Investment performance and exposures

The average cumulative investment performance of hedge funds, both for the sector as a whole and for most broadly defined investment strategies, was quite good during the first four months of 2012, despite some minor losses in April 2012 (see Chart 3.19). Many investment strategies more than recouped investment losses suffered in 2011. Hedge funds, especially those pursuing investment strategies with a directional bias, benefited from asset price gains in a wide range of financial markets globally in the first quarter of 2012 and managed to capture a significant proportion of asset price increases. It remains to be seen, however, and this is quite important for the long-term growth of the sector, how much call option-like downside protection hedge funds will manage to provide for their investors under less favourable market conditions.

Investment performance of hedge funds recovered in 2012...

Chart 3.19 Global hedge fund returns

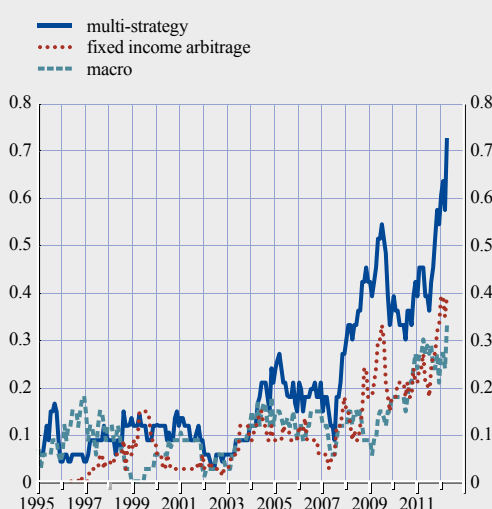
(Jan. 2011 – Apr. 2012; percentage returns, net of all fees, in USD)



Sources: Bloomberg, EDHEC Risk and Asset Management Research Centre and ECB calculations.
Notes: EDHEC indices represent the first component of a principal component analysis of similar indices from major hedge fund return index families. “CTA global” stands for “Commodity Trading Advisors”; this investment strategy is also often referred to as managed futures.

Chart 3.20 Medians of pair-wise correlation coefficients of monthly global hedge fund returns within strategies

(Jan. 1995 – Apr. 2012; Kendall's τ_b correlation coefficient; percentage monthly returns, net of all fees, in USD; moving 12-month window)



Sources: Lipper TASS database and ECB calculations.

The estimated similarity of hedge funds' investment positioning within broadly defined investment strategies and thus the associated risk of simultaneous and disorderly collective exits from crowded trades appeared to have either increased or remained high, in particular for some investment strategies with a directional investment bias. At the end of April 2012 moving median pair-wise correlation coefficients of the investment returns of hedge funds within investment strategies – a measure of the possible crowding of hedge fund trades – reached their respective all-time highs in the case of multi-strategy, macro and event-driven strategies and was very close to all-time highs for long/short equity hedge and fixed income arbitrage strategies (see Chart 3.20).

Funding liquidity risk and leverage

According to various estimates, investor net flows into the hedge fund sector resumed in the first quarter of 2012, supported by positive investment returns in the same period. Demand for hedge fund investments by institutional investors remained strong, not least because of low nominal yields on traditional debt investments, and many institutional investors continued to report their intentions to further increase allocations to hedge funds and other alternative investments.

All this implied limited near-term funding liquidity pressures associated with large investor redemptions, as also suggested by the forward redemption indicator shown in Chart 3.21. According to this indicator, forward redemption notifications received from investors, measured as a percentage of the total capital under management of covered hedge funds, were somewhat lower than in 2011. Forward redemption notifications and the resulting investor withdrawals exhibit strong seasonality because many single-manager hedge funds allow their investors to redeem money no more frequently than quarterly and sometimes even only semi-annually or annually.

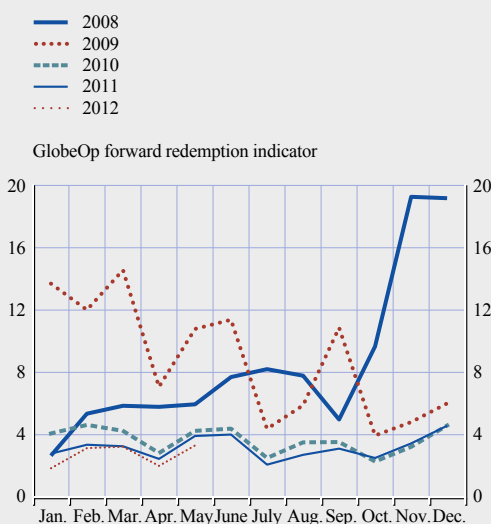
... while the estimated possible crowding of directional trades increased

Investor inflows resumed...

... implying limited investor redemption pressures in the near term

Chart 3.21 Near-term redemption pressures

(Jan. 2008 – May 2012; percentage of hedge fund assets under administration that investors plan to withdraw)

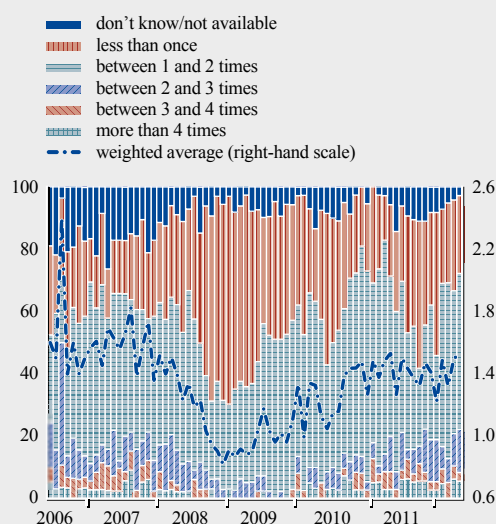


Source: GlobeOp.

Notes: Assets under administration refer to the sum of the net asset value (capital under management) of all hedge funds administered by GlobeOp. Data are based on actual redemption notices received by the 12th business day of the month. Investors may, and sometimes do, cancel redemption notices. Unlike subscriptions, redemption notifications are typically received up to 90 days in advance of the redemption date, depending on individual fund redemption notice requirements. In addition, the establishment and enforcement of redemption notification deadlines may vary from fund to fund.

Chart 3.22 Hedge fund leverage

(June 2006 – May 2012; percentage of responses and weighted average leverage)



Source: Bank of America Merrill Lynch, "Global Fund Manager Survey".

Notes: Leverage is defined as a ratio of gross assets to capital. In 2011 and 2012 the number of responses varied between 32 and 48.

The risk of cuts in bank financing did not seem to have increased either...

... while the use of financial leverage remained moderate

Possible funding liquidity pressures associated with withdrawals of short-term financing provided by banks did not seem to have increased either and thus also pointed to limited potential for a forced unwinding of investment positions. According to the Federal Reserve System's March 2012 survey on US primary dealers' financing terms³, price and non-price terms for US dollar-denominated securities financing and OTC derivatives transactions with hedge funds eased somewhat, on balance, over the three-month period ending in February 2012, thereby reversing the net tightening reported in the previous survey (see also the sub-section on counterparty credit risk in Section 4.1.2). Anecdotal evidence, however, suggested that owing to new liquidity and capital requirements, at least some prime brokers were considering passing higher financing and trading costs on to hedge fund clients, although reportedly none of the prime brokers wanted to be the first to make such a step.

The same Federal Reserve survey, following similar results in two earlier surveys, also revealed that, on a net basis, the use of financial leverage by hedge funds decreased, as did the availability of additional (and currently unutilised) financial leverage under existing agreements between dealers and hedge fund clients. Moderate aggregate leverage (see Chart 3.22), nonetheless, does not exclude the possibility that some hedge funds might resort to a more aggressive use of financial leverage. Benchmark interest rates, which together with a spread make up an effective borrowing rate, were low and quite a lot of hedge funds remained below their high watermarks, thereby presenting incentives for some hedge funds to increase risk-taking.

³ See Federal Reserve Board, "Senior Credit Officer Opinion Survey on Dealer Financing Terms", March 2012.

4 EURO AREA FINANCIAL INSTITUTIONS

The financial performance of large and complex banking groups (LCBGs) in the euro area deteriorated somewhat after the publication of the last Financial Stability Review (FSR) as modest improvements in operating profit were outweighed by higher provisions and sovereign debt write-downs. By contrast, most LCBGs strengthened their capital ratios in the first quarter of 2012, as part of the ongoing capital-raising exercise of the European Banking Authority (EBA). The financial soundness of large primary insurers in the euro area remained broadly stable in the fourth quarter of 2011 and the first quarter of 2012 – also with respect to improved investment income and profitability. The capital buffers of the sector have withstood the extraordinary losses from natural catastrophes in 2011 rather well.

Turning to banks' risk outlook, while wide-ranging liquidity support measures on the part of the Eurosystem have eased pressure for rapid deleveraging, many banks still face a structural need to downsize and adapt their balance sheets to a post-crisis environment. Indeed, a number of large euro area banks have already announced major restructuring plans, which involve significant asset reductions over the medium term and a reduced reliance on unstable wholesale funding sources. Aside from this, weakening macroeconomic prospects, together with vulnerabilities in the euro area non-financial sector, could have an adverse effect on the credit risks confronting banks and, if the risks materialise, on their balance sheets.

The most important challenges for the insurance sector in the euro area relate to investment and insurance underwriting activities, which are strongly impacted both by global and euro area growth prospects and by financial market developments. Low yields of highly rated government bonds continue to constrain profitability, while increased competition for funds from banks may impact the profitability of life insurance companies. As regards solvency, volatility in the form of a sudden increase in highly rated government bond yields could impact the asset valuations and capital of the industry, especially as capital buffers are already thin in some cases.

A scenario-based assessment of prevailing systemic risks for the euro area banking sector suggests that (i) an aggravation of the sovereign debt crisis, combined with extensive bank deleveraging, and (ii) an adverse shock to euro area economic activity could have substantial negative implications for the banking sector and the wider euro area economy. This is reflected in the marked decline in average euro area core Tier 1 capital ratios in both cases. A similar scenario for the euro area insurance sector suggests that, although insurers are quite heterogeneous and, collectively, vulnerable to market risks in especially bond markets, the risks appear to be manageable on aggregate.

4.1 REMAINING CHALLENGES IN THE EURO AREA BANKING SECTOR¹

4.1.1 FINANCIAL CONDITION OF LARGE AND COMPLEX BANKING GROUPS

The financial performance of euro area banks has weakened further on account of the worsened economic growth outlook and increasing credit risks since the finalisation of the last FSR. The latter resulted from higher loan loss provisions, including impairments of Greek sovereign debt, as well as from deteriorating property markets in some euro area countries. Banks' efforts to raise capital primarily through direct capital measures, in line with the EBA's recommendations

¹ The sample used for most of the analysis carried out in this section includes 18 euro area banks. The criteria for identifying them are described in ECB, "Identifying large and complex banking groups for financial system stability assessment", *Financial Stability Review*, December 2006. However, at the time of writing, not all quarterly figures were consistently available for all banks.

Weakening bank profits with high loan loss provisions at the end of 2011...

... despite a modestly improving net operating profit

of December 2011, contributed to improvements in banks' capital adequacy indicators and have already – when combined with the exceptional provision of central bank liquidity – reduced the risk of excessive deleveraging.

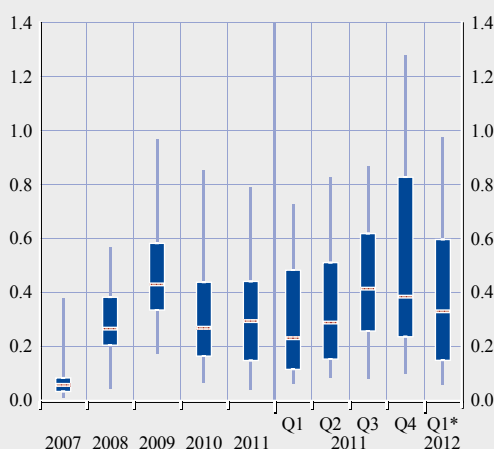
PROFITABILITY

The profitability of euro area LCBGs deteriorated further in the fourth quarter of 2011 as banks were confronted with a more pronounced than expected overall economic slowdown and weak property markets in some countries, as well as with investors' increased risk aversion with respect to banks in fiscally vulnerable countries. As expected, banks' net income, and thus also measures of their profitability such as the return on equity and the return on assets were adversely affected by write-downs related to the Greek sovereign debt exchange and, in the case of some banks, by goodwill impairment charges (see Charts S.6.12 and S.6.13). LCBGs' financial performance, as measured by the return on equity, improved somewhat in the first quarter of 2012 in comparison with the previous quarter, although it still showed a deterioration on a year-on-year basis. At the same time, the loan loss provisions of some banks increased significantly in the fourth quarter of 2011, reflecting a challenging economic environment, especially in countries with sovereigns under stress (see Chart 4.1). Loan loss provisions of most LCBGs decreased somewhat in the first quarter of 2012, partly because the additional impact of the Greek sovereign debt exchange was lower than in the previous two quarters.

The net operating profit before impairments and other one-off losses of some euro area LCBGs, by contrast, improved somewhat in late 2011 and in early 2012 in comparison with the third quarter of 2011 (see Chart 4.2). This was supported by some improvements in net interest income and, in particular in the first quarter of 2012, a rebound of net trading income (see Chart S.6.6). Net fee and commission income was stable in the last three months of 2011 and edged up in the first quarter of 2012.

Chart 4.1 Loan loss provisions of euro area LCBGs

(2007 – Q1 2012; maximum, minimum, median and interquartile distribution; percentages of total assets)

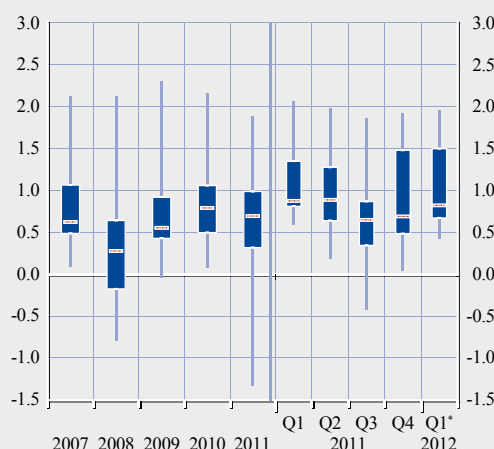


Sources: Individual institutions' financial reports and ECB calculations.

Notes: The figures for the first quarter of 2012 are based on data for a sub-sample of LCBGs for which results were available at the cut-off date of the FSR. The quarterly figures have been annualised.

Chart 4.2 Net operating profit of euro area LCBGs

(2007 – Q1 2012; maximum, minimum, median and interquartile distribution; percentages of total assets)



Sources: Individual institutions' financial reports and ECB calculations.

Notes: The net operating profit is the profit before the deduction of loan loss provisions and other impairment charges as well as one-off losses. The figures for the first quarter of 2012 are based on data for a sub-sample of LCBGs for which results were available at the cut-off date of the FSR. The quarterly figures have been annualised.

SOLVENCY

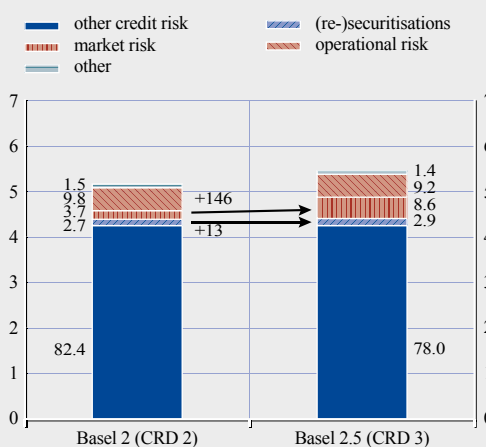
The evolution of regulatory capital ratios across euro area LCBGs was mixed in the fourth quarter of 2011, with about half the banks in the sample having improved their Tier 1 capital ratios, while those of the remaining banks deteriorated slightly. In some cases, however, the deterioration in the Tier 1 ratios reflected the buyback of subordinated debt which reduces the Tier 1 ratios, but increases the core Tier 1 ratios. By contrast, LCBGs' capital ratios increased across the board in the first quarter of 2012, as illustrated by an upward shift of the entire distribution of Tier 1 ratios (see Chart S.6.14), as banks have implemented various capital strengthening measures as part of the EBA's ongoing capital-raising exercise. As a result, LCBGs either complied with the EBA's new capital requirements at end-March or have made a significant progress towards reaching this target.

The strengthening of capital positions in the first three months of the year stemmed partly from direct capital measures, in line with plans submitted to the EBA, including new capital and reserves, the conversion of hybrid capital to equity and retained earnings. At the same time, the contribution of risk-weighted asset reductions to the improvement of LCBGs' aggregate Tier 1 capital ratio slightly outweighed that of increases in capital in the first quarter of 2012, suggesting a steady deleveraging process (see Chart S.6.15).

Regulatory changes also contributed to altering capital ratios through their implied change in the measurement of risk-weighted assets at euro area LCBGs. On 31 December 2011, the Capital Requirements Directive III (CRD III), which implements the so-called "Basel 2.5" regulatory framework, came into effect. While these new rules do not change the definition of regulatory capital instruments, nor do they increase capital thresholds, they should, in principle, reduce banks' capital ratios by applying considerably higher risk weights to re-securitisations in the banking book, to securitisations in the trading book and to market risks measured via internal models. Estimations based on the end-September data disclosed by the EBA suggest that an application of new rules would have led to an increase of 5.6% in the aggregated risk-weighted assets of euro area LCBGs – almost entirely attributable to higher risk-weighted assets for market risk (see Charts 4.3 and 4.4). The estimated

Chart 4.3 Aggregated impact of Basel 2.5 on the structure of the risk-weighted assets of euro area LCBGs

(Sep. 2011; y-axis: EUR trillions; percentages next to the bars and percentage changes on the arrows)



Sources: EBA and ECB calculations.
Note: Impact on the aggregated risk-weighted assets of euro area LCBGs if Basel 2.5 rules were implemented as of end-September 2011.

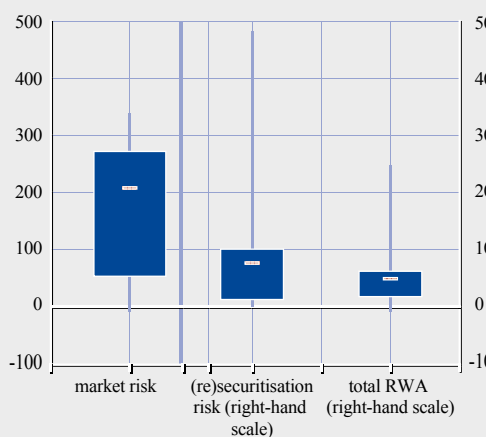
Increase in LCBGs' aggregate capital positions...

... consisting of direct capital measures and risk-weighted asset reductions...

... while new risk weights also altered capital ratios

Chart 4.4 Changes in the risk-weighted assets and their components of euro area LCBGs as a result of Basel 2.5

(Sep. 2011; maximum, minimum, median and interquartile distribution; percentages)



Sources: EBA and ECB calculations.
Note: Percentage changes in risk-weighted assets for market risk and securitisation risk if Basel 2.5 rules were implemented as of end-September 2011.

Strong impact of policy measures to curb funding risk...

... continued fragilities from a high reliance on wholesale funding

Banks' earnings outlook remains subdued...

implied average decline of the core Tier 1 capital ratios would amount to 0.5 percentage point, with estimated declines for individual institutions varying widely between 0.04 percentage point and 2.06 percentage points.² Therefore, some LCBGs with significant (re-)securitisation exposures, as well as large trading books, could react to the implementation of these rules by shedding more capital-intensive assets. In fact, some LCBGs have already announced plans to sell more structured credit assets or other portfolios affected by higher Basel 2.5 risk weights (e.g. correlation trading).

FUNDING STRUCTURE

Funding structures of euro area banks have been significantly affected by the Eurosystem's two three-year LTROs. Prior to the announcement of this non-standard policy measure, deteriorating conditions in euro area funding markets toward the end of 2011 were leading to higher funding costs and a lack of market access for banks in some euro area countries. The policy measure, in turn, appears to have contributed significantly to changes in euro area banks' funding structures, partly replacing unsecured interbank wholesale funding – in particular in December 2011 and March 2012 (see Chart 4.5).

Higher uncertainty in wholesale funding markets, particularly in unsecured funding, has resulted in further shifts in banks' funding strategies towards retail deposits. Taken together with subdued growth in bank lending, the loan-to-deposit ratios of euro area LCBGs decreased somewhat in the fourth quarter of 2011 and the first quarter of 2012 (see Chart S.4.3). That said, such ratios remain elevated by international standards, suggesting that euro area LCBGs continue to rely heavily on wholesale funding.

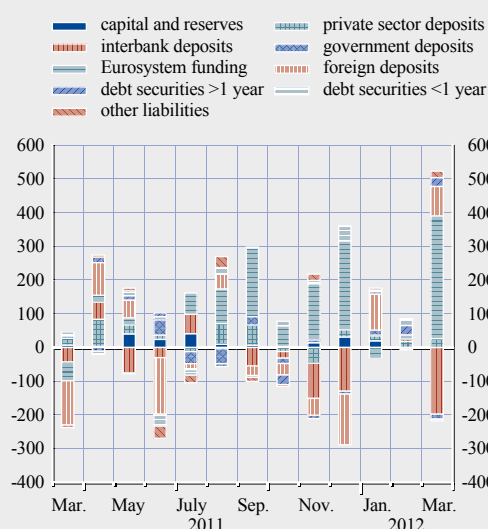
4.1.2 BANKING SECTOR OUTLOOK AND RISKS

EARNINGS OUTLOOK

Looking ahead, the outlook for euro area banks' earnings remains subdued in view of persistent pressure on revenue growth and the prospect of a rising cost of risk against a difficult macroeconomic backdrop in many parts of the euro area. The prospects for net interest income will be influenced by several factors. First, while wholesale funding costs are likely to remain high, at least in comparison with the first half of 2011, the significant funds borrowed through the Eurosystem's three-year LTROs could contribute to lowering aggregate funding costs. Second, banks' deposit margins are likely to remain compressed in an environment of low short-term interest rates. Third, the slight steepening of the yield curve observed in early 2012 could support income gained from banks' maturity transformation activities. The latter effect will vary, however, in line with differences in

Chart 4.5 Monthly changes in euro area MFIs' liabilities

(Mar. 2011 – Mar. 2012; EUR billions)



Source: ECB.

Notes: Derivative instruments are not shown. The results of the second three-year LTRO are reflected in the March data as the settlement date for the operation was 1 March.

² It should be noted that, in some cases, the actual impact of Basel 2.5 rules on end-2011 capital ratios may have been less significant than estimated, to the extent that some LCBGs have reduced the exposures affected by these rules in the fourth quarter of 2011.

the repricing of assets. In particular, banks operating in countries with predominantly variable mortgage rates are likely to benefit less from the steeper yield curves than those in countries where a significant proportion of such loans is granted at rates that are fixed for a long period (see Box 7 in the December 2010 FSR). Finally, carry trade activities could provide some, although probably only temporary, support for some banks' net interest income.

Breaking different sources of banks' non-interest income down into their components, some large euro area banks' trading results have benefited from increased trading volumes, in particular in bond markets, in the first quarter of 2012, but such improvements may not be sustainable in subsequent quarters, also in view of the recent re-intensification of sovereign debt concerns and its negative impact on trading activity. At the same time, the outlook for investment banking fees remains mixed. While banks' fees from debt underwriting should be supported by an increase in corporate bond origination, fee revenues related to merger and acquisition activity are likely to remain subdued in a weakening economic environment.

With the deterioration in the economic outlook, in particular in euro area countries facing recession in 2012, many banks may see their cost of risk rise in the months ahead. As already experienced in the case of euro area LCBGs in the fourth quarter of 2011, differences in loan loss provisions are likely to increase among euro area banks, in line with the differences in their country-specific macroeconomic outlook. The limited opportunities for revenue growth and the prospect of rising loan impairments will probably force banks to further improve their cost management. In fact, several large euro area banks have already announced cost-cutting targets as part of their restructuring plans for the next few years.

Overall, the above factors point to a further moderation in earnings growth for banks in the period ahead. This is also reflected in analysts' earnings forecasts for listed euro area LCBGs, which have been revised downwards during the last six months.

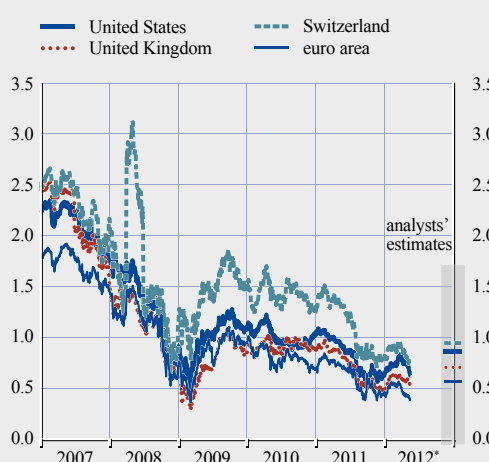
Outlook for the banking sector on the basis of market indicators

After the finalisation of the last FSR, market-based indicators pointed to some improvement in the risk outlook for euro area LCBGs until mid-March, but then started to deteriorate again on account of the re-intensification of the sovereign debt crisis. Consequently, equity market valuations and credit risk indicators still show an elevated risk aversion with respect to banks. This highlights the still considerable challenges confronting the euro area banking sector, including the need to adjust business models and rebalance funding profiles, as well as – at least in some countries – concerns about a deteriorating asset quality in a recessionary environment.

The only moderate recovery in equity prices of LCBGs from the lows of early December 2011

Chart 4.6 Actual and estimated price-to-book value ratios of euro area and global LCBGs

(Jan. 2007 – May 2012; averages)



Sources: Bloomberg, Thomson Reuters and ECB calculations.
Note: The latest estimates were revised in mid-May 2012, and refer to the estimated book values per share at the end of the 2012 fiscal year and target prices covering a horizon up to 18 months, with a horizon of 6 to 12 months being that used most widely.

... with several risks on the horizon

Market indicators point to some improvement in the risk outlook...

... but bank equity investors remain cautious

to mid-March, and the subsequent declines (see Chart S.6.3), appear to reflect persistent concerns among market participants about the health of the banking sector in an environment of suppressed economic growth. Indeed, the implied volatilities of bank equity indices both in the euro area and in the United States have remained higher than those of the general market, indicating that the uncertainty persisting about the outlook for banks is higher than that for other sectors. Looking forward, downward revisions to banks' target stock prices have led to a decline in estimated future price-to-book value ratios since the finalisation of the December 2011 FSR (see Chart 4.6).

The distance-to-default indicator, a market-based measure of LCBGs' credit risk, reached a record ten-year low at the turn of the year (see Chart S.6.5), suggesting that market participants continue to view the credit risk faced by euro area banks as elevated. At the same time, the decline in LCBGs' credit default swap (CDS) spread up to mid-March indicated some improvement in market participants' perceptions of banks' default risk (see Chart S.6.1). Thereafter, however, LCBGs' CDS spreads started widening again, reflecting the re-emergence of sovereign risk concerns in the euro area.

Box 6

WHAT DOES STOCK LENDING DATA TELL US ABOUT INVESTORS' SENTIMENT TOWARDS EURO AREA LARGE AND COMPLEX BANKING GROUPS?

The prices and trading data of securities and derivative instruments are a timely means of extracting quantitative market-based assessments relating to particular issuers. This has led to their common use, both as a monitoring tool and as an input into investment decisions. In this respect, securities lending data offer additional insights into investors' perceptions regarding specific issuers, also in the absence of significant fluctuations in the price of individual securities.¹ This box examines some securities lending market-specific indicators that can be used to analyse and monitor changes in investor sentiment using such data. It focuses on the lending and borrowing of selected stocks of large and complex banking groups (LCBGs) in the euro area with a view to gauging changes in investors' sentiment towards these banks.

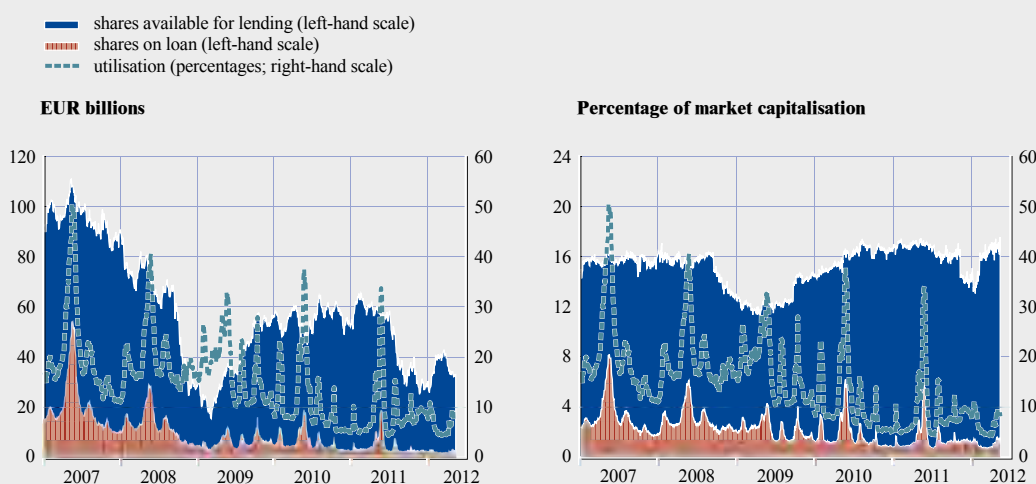
In mid-May 2012, the value of the shares on loan of the 11 euro area LCBGs, for which stock lending data were available, totalled at least €2.8 billion. This amounted to roughly 9% of at least €33 billion of lendable shares, i.e. stocks of the same LCBGs that were actively made available for lending (see Chart A, left-hand panel). The value of aggregate supply and demand, as well as the rate of utilisation, i.e. the ratio of borrowed to lendable shares, was quite volatile – although this appears to relate to valuation rather than volume effects, given relatively higher stability when measured as a proportion of market capitalisation (see Chart A, right-hand panel).

In the case of borrowing demand, annual and quarterly dividends cause regular and sharp increases in shares on loan before ex-dividend dates. Such developments stem from so-called dividend tax (arbitrage) trades that seek to lower taxes on dividend by exploiting differences in

¹ Securities lending involves a temporary transfer of securities to a borrower, who will usually have to provide the lender with collateral in the form of cash or other securities. See also Box 10, entitled "The euro area government debt securities lending market", in ECB, *Financial Stability Review*, December 2011.

Chart A Aggregate lending and borrowing of selected euro area LCBG stocks

(Jan. 2007 – May 2012)



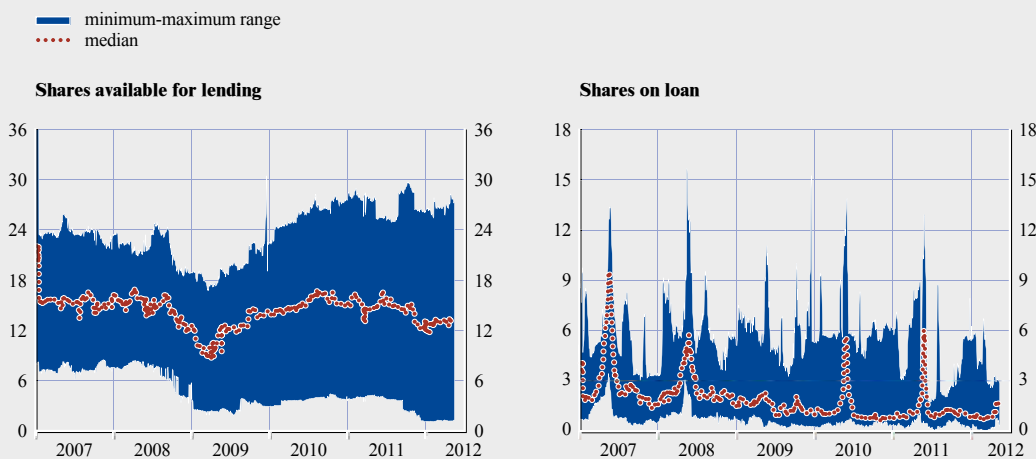
Sources: Data Explorers and ECB calculations.

Notes: Data include 11 euro area LCBGs. Utilisation is the ratio of borrowed securities to securities that were actively made available for lending. Securities on loan also include securities borrowed from sources other than those captured in the value of securities available for lending. In addition to changes in the quantity of securities, the value of lendable and borrowed securities is affected by changes in the price of those securities.

dividend taxation regimes across countries. Changes in shares on loan may also be associated with convertible arbitrage trades (short stock and long convertible bond issued by the same company), and thus certain filters would need to be used in order to estimate (pure) directional short-selling. Nevertheless, between dividend dates, the level and changes in short interest, measured as a ratio of either borrowed value to market capitalisation or borrowed quantity of shares to shares outstanding, could still be a good indicator of changes in investor sentiment.

Chart B Lending and borrowing of selected euro area LCBG stocks

(Jan. 2007 – May 2012; percentage of shares outstanding)



Sources: Data Explorers and ECB calculations.

Notes: Data include 11 euro area LCBGs. Securities on loan also include securities borrowed from sources other than those captured in the value of securities available for lending.

In this regard, it is noteworthy that aggregate short interest, as well as the utilisation of selected LCBG stocks, has been declining since the collapse of Lehman Brothers in September 2008 (see Chart A, right-hand panel), possibly also because of subsequent bans on short-selling. The same also held broadly true for individual bank stocks (see Chart B).

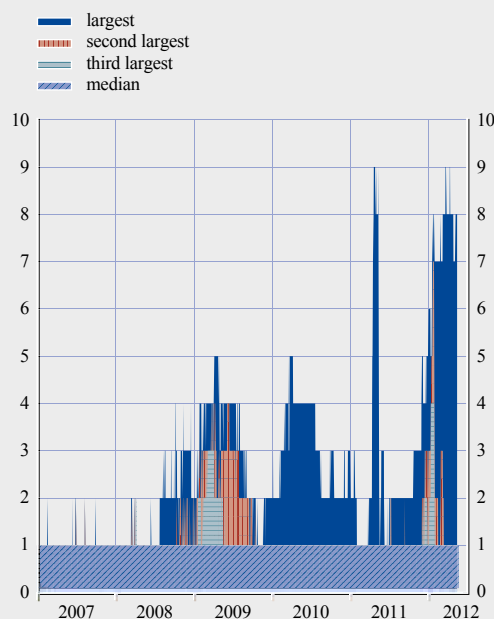
The interpretation of changes in lendable shares is more straightforward, as they should reflect changes in institutional ownership. An increase in shares available for lending would signal rising investor confidence, whereas a decrease would, *ceteris paribus*, indicate that institutional securities lenders are withdrawing their shares from the lending market, most probably because they plan to sell them. In this respect, two substantial declines in lendable shares stand out: one after the bankruptcy of Lehman Brothers and the other more recently in November 2011 (see Chart A, right-hand panel, and Chart B). The latter decrease in long interest was, however, largely reversed in 2012, both for individual bank stocks and for the selected banks as a group.

Finally, the stock borrowing fee serves as a good summary measure of underlying stock lending market dynamics and is the indicator of investor sentiment that is probably the easiest to interpret (see Chart C). According to this indicator, shares of a few selected euro area LCBGs were in high demand among short-sellers in early 2012, but this demand had largely disappeared by mid-May 2012.

All in all, stock lending market data may provide useful additional information about investors' perceptions of listed banks, even if, and especially when, a bank's share price does not change much. The data, however, are not always straightforward to analyse and interpret, so that a number of market-specific indicators need to be cross-checked simultaneously. In the case of selected euro area LCBGs, the prospects of some banks appear to have not been viewed favourably by securities lending market participants, but overall investor sentiment seems to have improved somewhat since the finalisation of the previous FSR.

Chart C Cost of borrowing selected euro area LCBG stocks

(Jan. 2007 – May 2012; cost of borrowing score based on seven-day stock borrowing fees)



Sources: Data Explorers and ECB calculations.

Notes: Data include 11 euro area LCBGs. The cost of borrowing score is a number from 1 to 10 that indicates the cost of borrowing particular securities based on seven-day fees, where 1 is the cheapest and 10 is the most expensive.

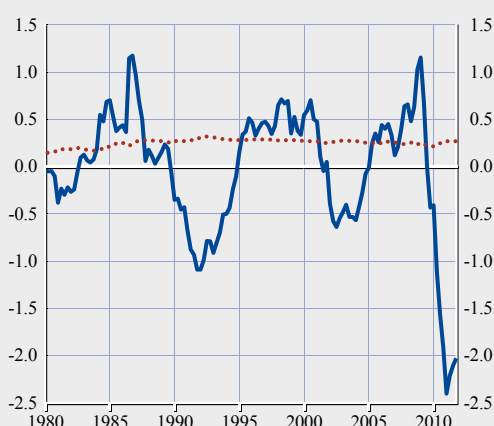
CREDIT RISKS

Indicators capturing the level of credit risk confronting the euro area banking sector have increased somewhat, on average, since the finalisation of the December FSR. These indicators, however, continue to differ greatly across countries, and across individual banks on account of banks' different geographical and sectoral credit risk exposures.

*Credit risk outlook
deteriorated
somewhat*

Chart 4.7 Global credit gap and optimal early warning threshold

(Q1 1979 – Q4 2011; percentages)

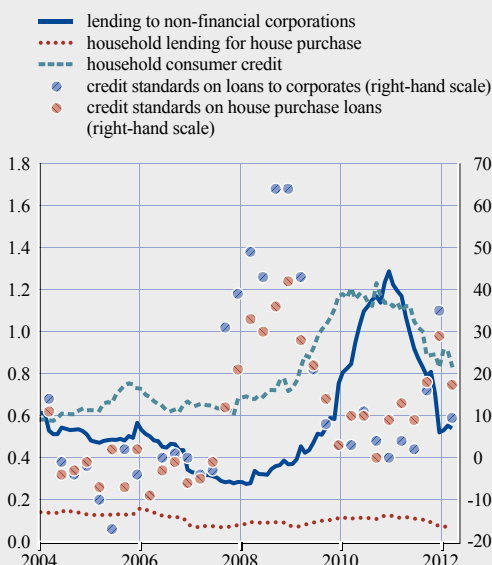


Source: ECB.

Note: For details, see, L. Alessi and C. Detken, "Quasi real time early warning indicators for costly asset price boom/bust cycles: A role for global liquidity", *European Journal of Political Economy*, Vol. 27(3), pp. 520-533, September 2011.

Chart 4.8 Write-off rates on euro area MFI loans and euro area banks' credit standards for loans or credit lines

(Jan. 2004 – Mar. 2012; percentages)



Source: ECB.

Note: The write-off rates are 12-month moving sums.

Looking at general credit growth and asset price developments, the latest reading of the global credit gap indicator suggests that credit is artificially low in comparison with historical norms as the indicator remained well below the early warning threshold for asset price boom/bust episodes in the fourth quarter of 2011 (see Chart 4.7).

The credit exposure of the whole euro area banking sector to households has increased somewhat, although with considerable heterogeneity at the country level. Total lending to households continued to expand in early 2012, albeit at a decelerating pace. At the same time, write-offs on housing loans extended by euro area MFIs have fallen somewhat in recent months (see Chart 4.8). However, euro area banks' credit risk exposures from mortgage lending vary significantly across countries. Credit risk from lending exposures to households remains significant for banks in some euro area countries with high household indebtedness, subdued household income prospects and/or a potential for a decline in residential property prices. A further credit risk stemming mainly from the household sector concerns euro area banks, and in particular their subsidiaries outside the euro area, that have extended residential mortgages denominated in a foreign currency. In Hungary, Austria, Poland and Romania, for instance, a considerable proportion of all loans is denominated in Swiss francs.

While euro area MFIs' lending to non-financial corporates continued to contract in early 2012, the sector generally remains resilient, despite vulnerabilities in some countries and sub-sectors (see Section 2.2). These positive overall developments in the non-financial corporate sector contributed to steadily declining write-offs on euro area banks' corporate loans throughout 2011, although write-off rates edged up in early 2012 (see Chart 4.8). Within the non-financial corporate segment,

*Banks tightened
their credit
standards further in
late 2011...*

*... on account of
both demand and
supply-side factors*

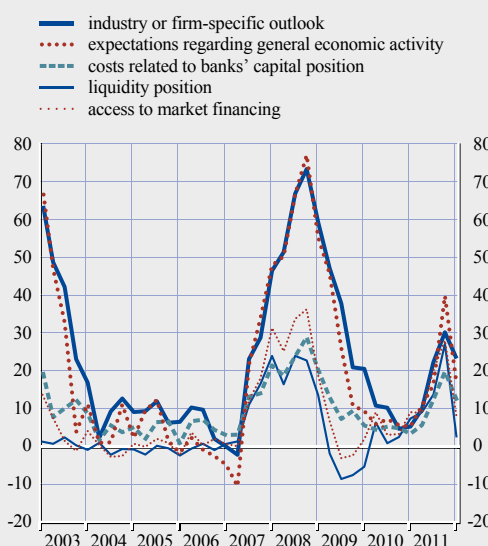
commercial property exposures continue to be the main source of credit risk confronting euro area banks. Most euro area countries have witnessed weaker conditions in commercial property markets in recent quarters and values remain subdued in comparison with previous years (see Section 2.3). Banks therefore continue to face elevated credit risks from their commercial property lending exposures, also because a large proportion of the outstanding loans are coming up for refinancing in 2012-13.

The latest survey data on bank lending standards suggests weakness in loan demand, together with a tightening of loan conditions, although the degree of tightening of credit standards decreased in the first quarter of 2012, as compared with three months earlier. According to the January 2012 bank lending survey (BLS), the net tightening of credit standards by euro area banks surged in the fourth quarter of 2011 for both loans to non-financial corporations and loans to households for house purchase, and to a lesser extent for consumer credit, while the April 2012 BLS results showed a substantial decline in the net tightening of credit standards both for corporate and for household loans.

In the last quarter of 2011, participating banks explained the surge in the net tightening of credit standards with the adverse combination of a weakening economic outlook and the euro area sovereign debt crisis, which continued to undermine the banking sector's financial position. Highlighting the persistently elevated levels of credit risks in the non-financial corporate sector, banks continued to indicate that a bleak industry or firm-specific outlook for their corporate borrowers was one of the main drivers of tighter lending standards (see Chart 4.9). For lending to households for house purchase, a deterioration in economic and housing market-specific prospects was reported to have contributed significantly to the increase in the net tightening of credit standards on mortgage loans, albeit less so than pure supply-side factors. In the first quarter of 2012, the decline in the tightening of credit standards mainly reflected an easing of pressures emanating from cost-of-funds and balance-sheet constraints, although demand-side factors also contributed to the less marked tightening of standards.

Chart 4.9 Changes in euro area banks' credit standards for loans or credit lines to non-financial corporations

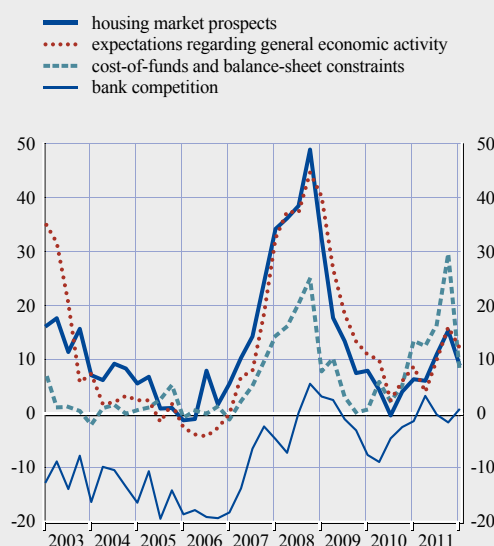
(Q1 2003 – Q1 2012; net percentage of banks contributing to tightening standards)



Source: ECB.

Chart 4.10 Changes in euro area banks' credit standards for loans or credit lines to households for house purchase

(Q1 2003 – Q1 2012; net percentage of banks contributing to tightening standards)



Source: ECB.

Looking ahead, according to the April 2012 BLS results, euro area banks expected a further net tightening of credit standards in the second quarter of 2012, albeit at an even slower pace than in the first three months of the year.

Although a combination of more prudent lending behaviour and a reduction in legacy bank lending can help mitigate increased credit risks, such action could lead to negative second-round effects on the economy through a reduced availability of credit. In particular, if lending standards remain tight, write-off rates on loans to non-financial corporations and on some household loans are likely to increase (see Chart 4.8).

The introduction of the three-year LTROs, however, would be expected to mitigate funding concerns and to reduce pressures faced by some banks that could lead to excessive credit rationing. A slower net tightening of credit standards could therefore be expected in coming quarters. This is also supported by the fact that improved money market conditions have in the past been followed by an easing of credit standards (see Chart 4.11).

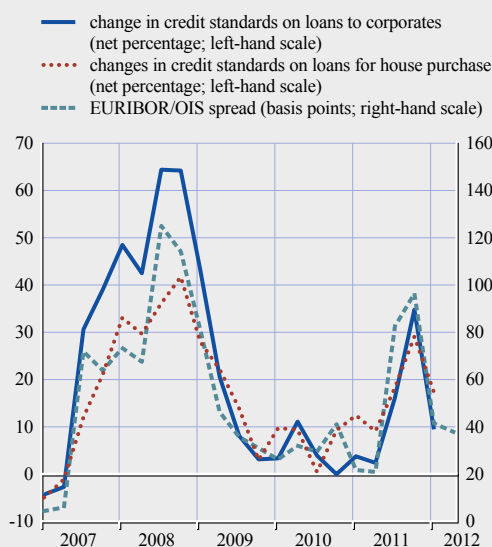
Counterparty credit risk

The median cost of protection against the default of a euro area LCBG, as reflected by CDS spreads, had decreased significantly by mid-March 2012, but then started to rise. By mid-May 2012, it was nevertheless lower than in late November 2011 (see Chart 4.12). An improvement was also observed in the euro area spread between unsecured interbank and repo rates (see Chart S.5.7). Although market participants continued to view euro area LCBGs as somewhat less creditworthy than their non-euro area counterparts, largely on account of exposures to euro area sovereign credit risk, the close co-movement of perceived riskiness also suggested a high degree of interdependence between the largest banks globally.

While counterparty credit risk limits for unsecured exposures towards euro area banks from countries under stress, if any, remained low, willingness to lend on a secured basis had reportedly increased somewhat, as evidenced by

Chart 4.11 Changes in euro area banks' credit standards for loans or credit lines and the three-month EURIBOR/OIS spread

(Q1 2007 – May 2012)



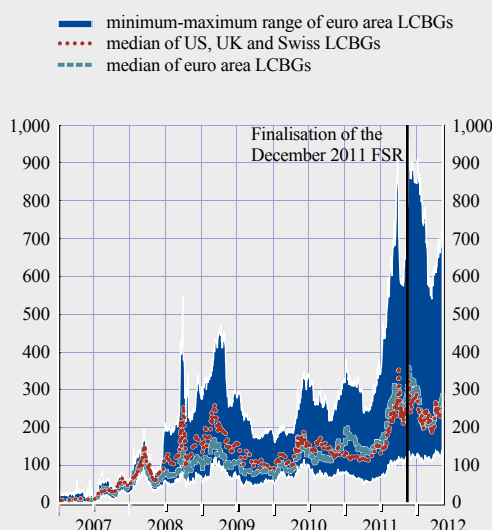
Sources: ECB and Bloomberg.

The risk of loan deleveraging remains...

... but has been mitigated as a result of recent policy actions

Chart 4.12 CDS spreads of euro area and global LCBGs

(Jan. 2007 – May 2012; spreads in basis points; senior debt; five-year maturity)



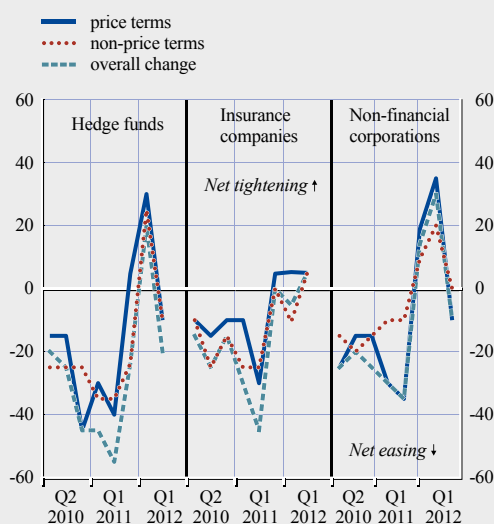
Sources: Bloomberg and ECB calculations.

Perceived counterparty credit risk of euro area LCBGs declined somewhat...

... but cautiousness and concerns remain

Chart 4.13 Changes in the credit terms of US primary dealers for US dollar-denominated securities financing and OTC derivatives transactions with non-dealers

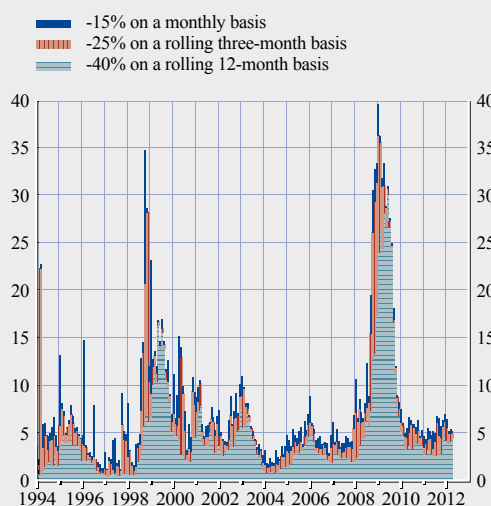
(Q2 2010 – Q1 2012; net balance of realised changes as a percentage share of reporting dealers)



Sources: Federal Reserve Board and ECB calculations.
Notes: The net balance is calculated as the difference between the number of respondents reporting “tightened considerably” or “tightened somewhat” and those reporting “eased somewhat” or “eased considerably”. Up to the second quarter of 2011, the “hedge funds” group also included private equity firms and other similar private pools of capital, while the “insurance companies” group included pension funds and other institutional investors.

Chart 4.14 Estimated proportion of hedge funds breaching triggers of cumulative total NAV decline

(Jan. 1994 – Apr. 2012; percentage of total reported NAV)



Sources: Lipper TASS database and ECB calculations.
Notes: Excluding funds of hedge funds. Net asset value (NAV) is the total value of a fund’s investments less liabilities; also referred to as capital under management. For each point in time, estimated proportions are based only on hedge funds which reported respective NAV data and for which NAV change could thus be computed. If several typical total NAV decline triggers were breached, then the fund in question was only included in the group with the longest rolling period. If, instead of one fund or sub-fund, several sub-fund structures were listed in the database, each of them was analysed independently. The most recent data are subject to incomplete reporting.

substantial declines in the repo rates for Italian and Spanish government bond collateral after the three-year LTROs (see also Section 3.1). Cautiousness and concerns nevertheless persisted, as suggested by, for example, an increased use of central counterparties (CCPs).³ In this context, it is also noteworthy that market participants paid increasingly more attention to the management of both their exposures to CCPs and CPP practices in general, not least because of the forthcoming mandatory clearing of standardised over-the-counter (OTC) derivatives and the related margin requirements for non-centrally cleared derivatives.

Counterparty credit terms for wholesale non-bank clients seemed to have changed little, perhaps with some minor exceptions in the case of hedge funds. Such terms are influenced more often than not by competition from globally active banks and, in this respect, the Federal Reserve System’s latest quarterly opinion survey on dealer financing terms indicated little change, on balance, in price and non-price counterparty credit terms for the financing of US dollar-denominated securities and OTC derivatives transactions with non-dealer counterparties (see Chart 4.13).⁴ However, surveyed dealers, some of which were European LCBGs, continued to report persistent pressure from hedge funds to negotiate more favourable credit terms and indicated that the easing of terms was influenced, where

Credit terms for wholesale non-bank clients appeared to have changed little

³ In December 2011, the share of CCP-cleared European repos rose to 32%, from 30.5% in June 2011 (see International Capital Market Association, “European repo market survey”, No 22, December 2011).
⁴ Federal Reserve Board, “Senior Credit Officer Opinion Survey on Dealer Financing Terms”, March 2012.

this occurred, by competition from other institutions. Nonetheless, at the end of April 2012, the estimated proportion of hedge funds breaching triggers of cumulative total decline in net asset value (NAV)⁵ was close to its longer-term median, suggesting moderate counterparty credit risk associated with banks' exposures to these important and usually very active leveraged non-bank counterparties (see Chart 4.14).

FUNDING LIQUIDITY RISK

Wide-ranging liquidity support measures by the Eurosystem have contributed to reducing near to medium-term refinancing risks for euro area banks, thereby helping to improve conditions in funding markets – including segments such as unsecured lending where issuance had slowed to a trickle in late 2011. This was reflected in a pick-up of euro area banks' issuance of medium and long-term debt in the first two months of 2012, as well as in the substantial tightening of average spreads on senior unsecured debt and, to a lesser extent, on covered bonds (see Charts 4.15 and 4.16). Funding conditions, however, have deteriorated since late March, as illustrated by a significant drop in debt issuance in April and May, and by a moderate widening of senior unsecured and covered bond spreads.

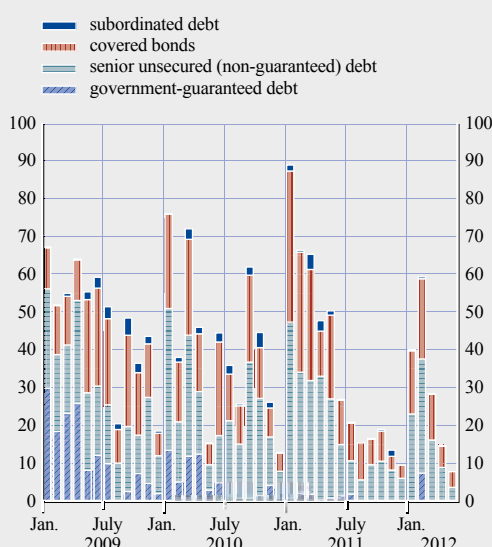
Euro area banks refinanced 53% of their term debt that matured in the first five months of 2012, resulting in negative net issuance of around €130 billion. However, this related less to a manifestation of refinancing risks and more to funding substitution as the large take-up of the Eurosystem's three-year LTROs is likely to have eased the need of some banks to refinance themselves in the market in the near term. Moreover, the term refinancing needs of some banks may be lower on

*Conditions in bank
funding markets
improved in the first
quarter of 2012...*

5 NAV triggers can be based on a cumulative decline in either total NAV or NAV per share, and allow creditor banks to terminate transactions with a particular hedge fund client and seize the collateral held. As opposed to NAV per share, a cumulative decline in total NAV incorporates the joint impact of both negative returns and investor redemptions.

Chart 4.15 Monthly issuance of medium-term and long-term debt by euro area banks

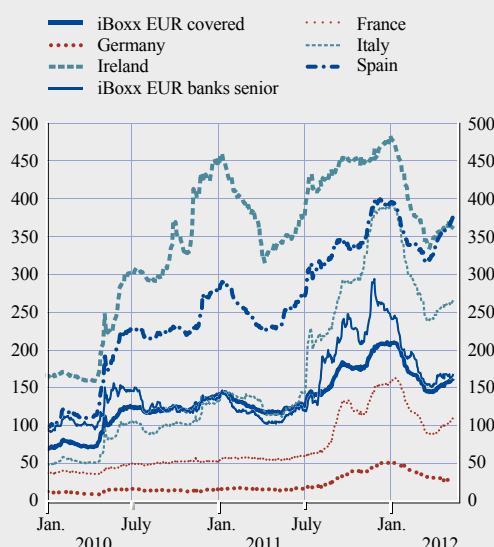
(Jan. 2009 – May 2012; EUR billions)



Source: Dealogic DCM Analytics.
Note: Excludes retained deals.

Chart 4.16 Spreads between covered bond yields and euro swap rates

(Jan. 2010 – May 2012; basis points)



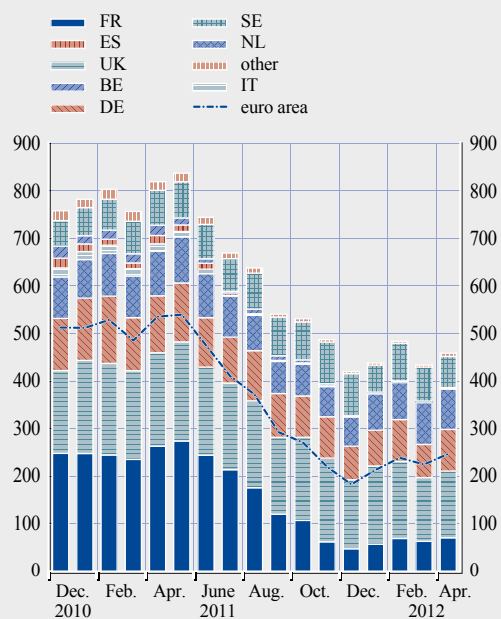
Source: Markit.

account of balance sheet reductions as part of the ongoing deleveraging processes. In fact, a significant proportion of the negative net debt issuance in the first five months of the year was related to banks undergoing restructuring, partly as a result of the implementation of plans required under EU state aid rules.

Another sign of improving funding conditions could be found in the fact that conditions in short-term US dollar funding markets for euro area banks improved as well, as illustrated by the significant tightening of the EUR/USD foreign exchange (FX) swap basis and the reversal of the decreasing trend in the exposures of US prime money market funds to euro area banks (see Chart 4.17). However, money market funds still remain cautious in their investment behaviour, as indicated by the predominantly very short maturities of their exposures to euro area bank debt. At the same time, some large euro area banks have continued their US dollar deleveraging, thereby further reducing their funding needs.

Chart 4.17 US prime money market funds' exposures to euro area and other EU banks

(Dec. 2010 – Apr. 2012; USD billions)



Source: Securities and Exchange Commission.

Deposit flows showed rather diverging patterns in different parts of the euro area in the last quarter of 2011 and in early 2012, with significant inflows to the banking sectors of “core” countries contrasting with outflows experienced, at least in some months, by some (but not all) countries under sovereign stress.

... but market access remains difficult or costly for many banks...

Notwithstanding these improvements, market funding for some banks – in particular from countries with strained sovereigns – remains difficult or prohibitively expensive, as also illustrated by a strong tendency towards recourse to Eurosystem operations in these countries. In addition, funding costs remain highly differentiated for banks with market access, possibly reflecting differences in sovereign risk and/or individual banks’ risk profiles. For a sub-sample of euro area LCBGs, for instance, swap spreads on five-year senior unsecured debt issued in the first quarter of 2012 varied widely between 148 and 355 basis points.

... and significant structural challenges still lie ahead

Furthermore, despite some progress over recent years, many euro area banks need to reduce their reliance on wholesale funding further, and to adjust their business models to changed conditions in private funding markets. In fact, several large euro area banks have announced significant restructuring plans, partly in response to the more difficult funding environment, which also involve significant declines in assets (see Special Feature A). Another structural challenge arises from the fact that euro area banks’ funding saw a shift towards more secured funding – such as covered bonds and repo financing – in recent years, which contributes to a higher encumbrance of bank balance sheets (see Box 7 for details). While risks from rising asset encumbrance appear to be manageable for most LCBGs, concerns remain about decreasing demand for senior unsecured debt as a result of investor concerns about structural subordination and uncertainty about the scope of the European Commission’s “bail-in” proposal.

Box 7

ASSET ENCUMBRANCE AT EURO AREA LARGE AND COMPLEX BANKING GROUPS

Asset encumbrance, or a declining pool of unpledged assets for unsecured creditors, has become quite topical in the context of a shift towards secured borrowing in bank funding patterns. While asset encumbrance as a result of an increased use of secured funding is frequently cited as a concern by analysts, its measurement at an aggregate level is not straightforward and must be inferred. This box attempts to shed more light on the magnitude of balance sheet encumbrance at euro area LCBGs, using data that are publicly available in the form of banks' annual reports.

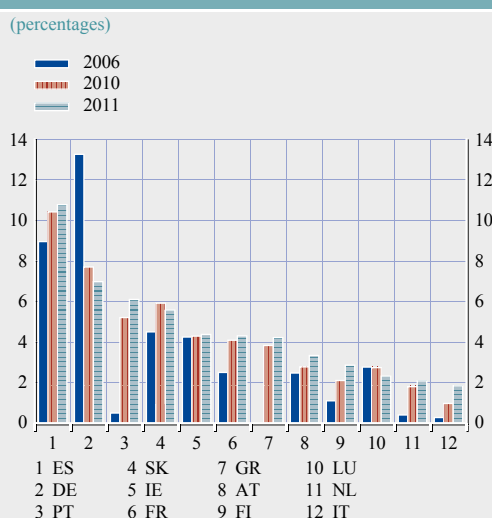
In recent years, there has been a shift in banks' funding structures towards secured funding, including covered bond and repo funding, as well as, in some cases, collateral (liquidity) swaps. The share of covered bonds in total liabilities had increased in most euro area countries since 2006, with the notable exception of Germany (see Chart A). The increase in covered bond funding is compounded by the rising levels of over-collateralisation, i.e. the size of the cover pool assets relative to the bonds they collateralise, as required by rating agencies to maintain the high(er) ratings for covered bonds. Furthermore, the recent large take-up of Eurosystem liquidity on a secured basis has contributed further to the widespread perception of rising asset encumbrance.

Looking at euro area LCBGs, the share of secured funding in total liabilities (approximated by the combined share of covered bonds and repo funding) varied within a wide range of between 2% and 32% at the end of 2011 (see Chart B), suggesting a significant heterogeneity in asset encumbrance levels among banks, which in turn reflected differences in their business models or specificities of their local funding markets.

Rising asset encumbrance levels have also led to concerns about the structural subordination of investors in senior unsecured debt. These concerns have been reinforced by uncertainty about the details of the forthcoming legislation on "bail-in" debt, which will probably involve unsecured senior bondholders sharing in the burden in the case of bank failures as part of plans to end taxpayer bailouts of financial firms. In addition, more countries may introduce depositor preference laws, thereby further reducing the volume of assets that would be left for unsecured creditors in the event of default.

Taken together, all these factors would imply lower recovery rates on senior unsecured bank debt, and unsecured debt investors may thus start to demand higher compensation for assumed risks. However, a cross-sectional regression analysis of five-year bank credit

Chart A Share of covered bonds in bank liabilities in selected euro area countries

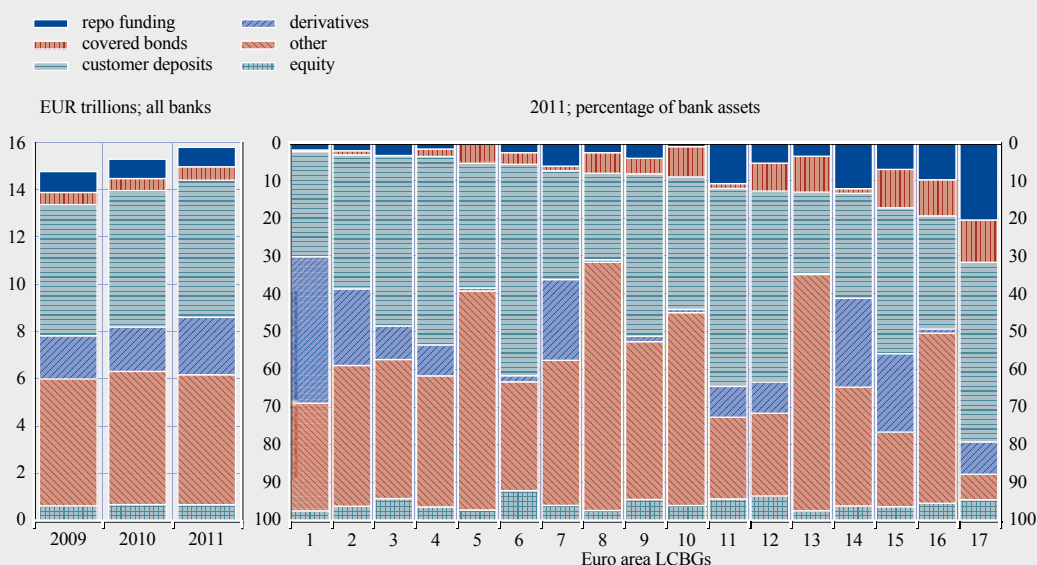


Sources: Association of German Pfandbrief Banks (vdp), Dealogic, ECB, European Covered Bond Council and ECB calculations.

Note: 2011 figures are estimates, except those for Germany.

Chart B Liabilities of selected euro area LCBGs from 2009 to 2011

(2009 – 2011)



Sources: Bank reports and ECB calculations.

Notes: Data cover 17 euro area LCBGs. Repo funding includes both central bank and private sector repos.

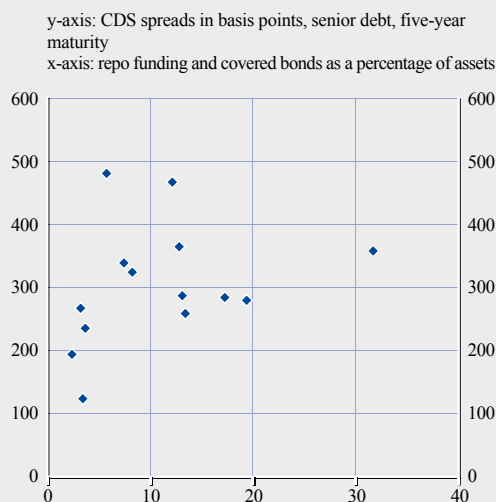
default swap (CDS) spreads on the share of secured funding in overall funding (calculated as the sum of repo and covered bond funding in total assets or in total assets excluding derivatives) and the corresponding sovereign credit default swap (CDS) spreads revealed that only the sovereign factor was a statistically significant driver of bank CDS spreads in 2011, and also in 2010 (see also Chart C).

If unsecured bank funding costs remain uneconomically high, banks will have to look for other sources of funding in the medium term. Options appear to be rather limited, however, as aggressive competition for deposits might reduce interest rate margins, while higher covered bond issuance or other secured funding would increase asset encumbrance further. Therefore, it is crucial that banks regain investor confidence by strengthening their balance sheets, first and foremost by increasing their capitalisation levels.

All in all, data publicly available in the form of banks' annual reports suggest that asset encumbrance at banks has been increasing, thereby warranting close monitoring. In addition, recent regulatory initiatives, in particular the "bail-in" debt provisions included

Chart C Asset encumbrance and bank CDS spreads

(2011; percentage of assets and basis points)



Sources: Bank reports, Bloomberg, Dealogic and ECB calculations.
Notes: Data cover 14 euro area LCBGs for which CDS spread data was available. Repo funding includes both central bank and private repos.

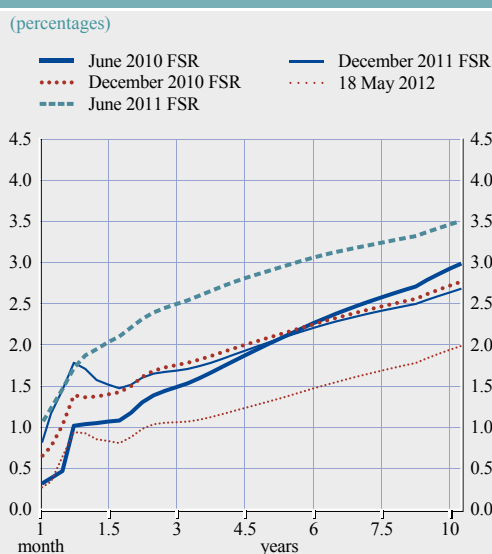
in forthcoming legislation on bank resolution, have contributed to investor perceptions that recovery rates for unsecured creditors are likely to be lower in the future. As a consequence, unsecured funding appears to have the potential to remain expensive, thereby depriving banks of this historically important source of funding, unless they regain investor confidence through stronger balance sheets and higher capitalisation levels. It must be acknowledged, however, that heterogeneity in asset encumbrance remains significant among banks, possibly also as a function of their business models. More generally, a dearth of hard data on asset encumbrance also highlights the need for a better disclosure, also of details on the level of haircuts/over-collateralisation for assets pledged under different forms of secured funding. In fact, the lack of clarity about the degree of banks' balance sheet encumbrance creates uncertainty among senior debt investors and could thus also contribute to higher unsecured funding costs, with concomitant strains on key financial institutions.

MARKET-RELATED RISKS

Banks' interest rate risk has decreased somewhat over recent months – in terms of both yield curve dynamics and interest rate volatility. Policy measures – taken at the national and at the supranational level – have contributed to containing risk perceptions at both the short and the long end of the euro area yield curve. Compared with the December FSR, the yield curve has steepened, at least in some euro countries with higher long-term sovereign bond yields, while yield levels across the entire yield curve are the lowest recorded since at least the beginning of 2007. In particular, the temporary non-standard measures taken by the ECB have contributed significantly to lowering the level of euro area government bond yields. The euro area yield curve continues to support banks' revenues from maturity transformation activities, which have been reinforced somewhat by the recent slight steepening of the yield curve (see Chart 4.18).

Data on MFI holdings of government securities in countries where LCBGs are located indicate that median bank holdings of government securities have declined between the finalisation of the December 2011 FSR and March 2012. The differences between countries are significant, however, with banks resident in some countries having decreased their portfolios by 10%, year on year, while others having increased them by almost 50%. By contrast, banks' holdings of domestic sovereign bonds have risen markedly since January 2012 in most countries where LCBGs are located, with smaller but noteworthy differences between countries (see Chart 4.19). Domestic sovereign bond holdings increased most in countries with above-average bond yields. This suggests that at least some banks have engaged in carry trades so as to benefit from the difference between the ECB's low refinancing rate and high sovereign bond yields.

Chart 4.18 Developments in the euro area yield curve



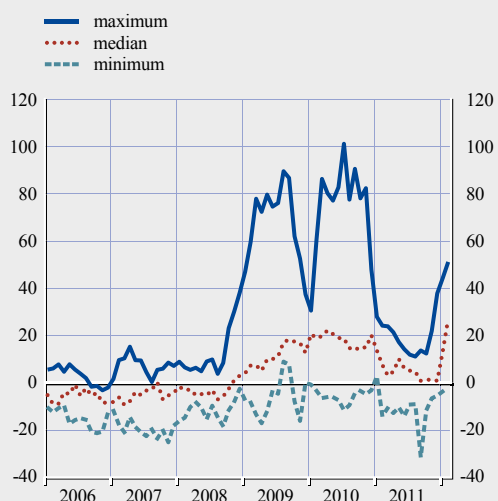
Sources: ECB and Bloomberg.

Interest rate volatility falls and the yield curve steepens slightly

Decrease in bank holdings of government bonds, albeit to a differing degree...

Chart 4.19 Annual growth rates of MFIs' domestic government bond holdings in countries where LCBGs are located

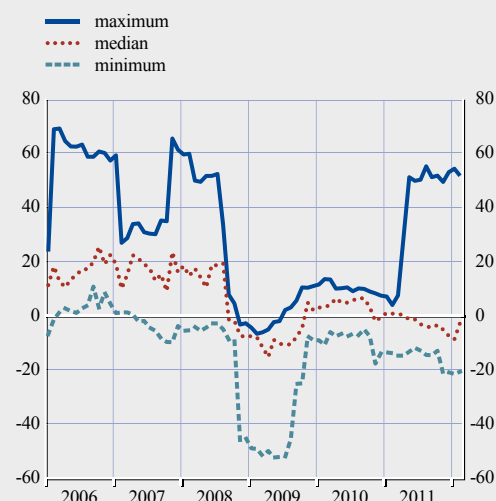
(Jan. 2006 – Mar. 2012; percentage change per annum)



Sources: ECB and ECB calculations.

Chart 4.20 Annual growth rates of shareholdings by MFIs in countries where LCBGs are located

(Jan. 2006 – Mar. 2012; percentage change per annum)



Sources: ECB and ECB calculations.

... combined with reduced equity holdings...

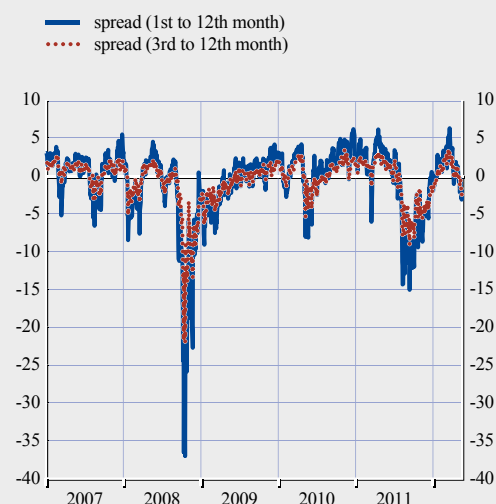
According to the Dow Jones EUROSTOXX volatility index, the situation in equity markets was very turbulent in the third and fourth quarters of 2011. As a result, the median equity value at risk (VaR) of euro area LCBGs increased somewhat as a percentage of Tier 1 capital. The impact of increased volatility on VaR measures was partially offset by the simultaneous increase in Tier 1 equity. At the same time, MFI statistics on banks' shareholdings indicate that, on average, LCBGs decreased their equity market exposures in the second half of 2011 and in the first quarter of 2012 (see Chart 4.20). This could be attributed in part to banks' deleveraging activities over that period, which probably also comprised sales of some of their trading assets.

... with markets experiencing a rise in stock market volatility

A significant decrease in equity market volatility was witnessed in the first quarter of 2012. Assessed in terms of the change in the slope of the volatility futures curve, however, the low level of volatility witnessed was not seen to be sustainable in the period ahead. In fact, the volatility futures curves (for the VIX and the VStoxx) steepened in the first months of 2012 to levels not seen since the beginning of the current financial crisis (see Chart 4.21). This implied that markets did not have great faith in the sustainability of the equity rally witnessed in the first quarter of 2012 and were pricing in material corrections. The record steepness of

Chart 4.21 The slope of the Dow Jones EUROSTOXX 50 volatility index futures curve

(Jan. 2007 – May 2012; percentages)



Source: Bloomberg.

Note: The slope of the VStoxx futures curve is measured as the spread between the twelfth and the first month and/or between the twelfth and the third month.

the volatility futures curves may have been partly related to the pricing of non-standard measures by major global central banks, measures that are, by definition, temporary in character. Indeed, Eurostoxx50 volatility started to increase again in the second quarter of 2012 reflecting also, in part, the decrease of the impact of central bank non-standard measures.

4.1.3 ASSESSING THE RESILIENCE OF EURO AREA BANKS

This section provides a quantitative assessment of two distinct macro-financial scenarios that seek to map the main systemic risks identified in Sections 1 to 3, and to illustrate their importance on the basis of a top-down solvency analysis of the euro area banking sector. This analysis was carried out on the basis of the ECB's macro stress-testing framework, using publicly available bank-level data and exposure data disclosed in the 2011 EU-wide stress test and the EU Capital Exercise.⁶

The assessment focuses on the following risks: (i) intensified contagion of euro area sovereign distress combined with extensive bank deleveraging – materialising through an increase in euro area interest rates, stock price declines and a reduced reliance on bank debt financing;⁷ and (ii) an economic slowdown in the euro area – illustrated by a euro area domestic demand shock reflecting a slowdown in global growth and confidence effects from the euro area sovereign debt crisis. The combination of the two distinct shocks is also considered in a joint scenario in order to reflect the strong interconnections between, and reinforcing mechanisms of, these risks (see Table 4.1).

The first part of this section describes the two macro-financial shock scenarios. The second part presents the impact of these scenarios on the loss absorption capacity of the euro area banking sector.⁸ The effects on the banking sector are assessed using models of bank profitability and model-based estimates of credit and market risk-related losses.

CONTAGION OF SOVEREIGN RISK WITH BANK DELEVERAGING

The contagion and deleveraging scenario assumes an increase in euro area sovereign bond yields to abnormally high levels that is accompanied by negative shocks to stock prices. The shocks are assumed to emanate from euro area countries that are not under EU/IMF programmes and that are currently

A quantitative assessment of two distinct macro-financial scenarios...

...namely intensified contagion and deleveraging, on the one hand, and economic slowdown, on the other

Under the first scenario, euro area sovereign bond yields rise to abnormally high levels...

- 6 This assessment is based on a macro-prudential simulation exercise involving top-down stress-testing tools. The results of this analysis are not comparable with those of micro-prudential stress tests used for supervisory purposes, which analyse the solvency of individual financial institutions.
- 7 Owing to the difficulty of disentangling sovereign-bank funding interlinkages from forces driving the deleveraging process, the two risks are treated jointly.
- 8 The results are derived using publicly available data based on euro area banks' financial reports up to the third quarter of 2011, including data disclosed in the context of the EBA's 2011 EU-wide stress test and the EU Capital Exercise, and are not based on confidential supervisory information.

Table 4.1 Mapping of the main systemic risks to adverse macro-financial scenarios

	Scenario/shock	Sovereign contagion and bank deleveraging shock	Shock to euro area domestic demand	Joint scenario
Type of systemic risk	Aggravation of euro area sovereign debt problems	√		√
	Risks of excessive deleveraging	√		√
	Slowdown in economic activity		√	√

*... accompanied by
a sharp decline in
stock prices*

*This implies losses
in the trading book
and an increase
in banks' cost of
funding...*

*... as well
as negative
implications for
banks' credit risk*

perceived by market participants as being most vulnerable to possible further contagion from such countries, albeit for somewhat differing reasons (namely Belgium, France, Italy and Spain).⁹

The simulation results in long-term government bond yields rising from the levels recorded in mid-May 2012, by between 62 and 961 basis points. For some countries, the resulting bond yields would be at highs not seen since the late 1990s.¹⁰ Apart from the three euro area countries under EU/IMF programmes, the corresponding impact on government bond yields in all other euro area countries is considerably smaller, with increases ranging from 62 to 450 basis points. The slope of national yield curves relative to the national ten-year benchmark yields on the cut-off date of mid-May 2012 is used to transpose the simulated shock to maturities other than ten years. It is moreover assumed that interest rates at all maturities remain at the higher level throughout the simulated horizon. For the stock price shocks, the scenario implies an equity price decline ranging from 0% to 35% across all euro area countries.¹¹

The simulated increase in sovereign bond yields has a number of effects on banks' profit and loss accounts.

First, it implies marking-to-market valuation losses on euro area banks' sovereign exposures in the trading book.¹²

Second, the increase in sovereign credit spreads would be expected to raise the cost of euro area banks' funding via a number of channels. First, an immediate and persistent increase of 40 basis points above the baseline in short-term market interest rates is assumed.¹³ Moreover, wholesale bank funding costs are affected by country-specific shocks to CDS spreads that have been scaled to the calibrated shocks to ten-year government bond yields.¹⁴ Finally, the rise in short-term interest rates is assumed to be passed on to short-term retail loan and deposit rates, thereby affecting banks' net interest income.

Third, the country-specific shocks to interest rates and stock prices would have direct implications for the macroeconomic outlook, which will in turn affect banks' credit risk.¹⁵ Compared with the baseline growth rates, the shocks translate into an overall decline of euro area real GDP growth of 0.2 and 0.7 percentage point in 2012 and 2013 respectively. There are, however, notable cross-country differences, with real GDP growth in some of the more distressed countries declining

9 The selection of countries that are potentially vulnerable to further contagion is based on sovereign bond yield levels in mid-May 2012. Smaller countries, e.g. Cyprus and Slovenia, have not been considered as a source of shocks since they have either no sovereign bonds outstanding or insufficient data quality for a robust analysis to be performed. The calibration of the sovereign bond yield shock is based on the daily compounded changes in ten-year government bond yields and stock prices observed since May 2010. These observations are used to simulate a joint, multivariate forward distribution of the yields and stock prices 60 days ahead. In the simulation, long-term interest rates (and stock prices) in Belgium, France, Italy and Spain are shock-originating markets, with the shocks assumed to occur with 1% probability. The response for all other markets/countries is computed using a non-parametric model consistent with the shock probability assumption.

10 While not considered in this exercise, such high government bond yields may trigger self-fulfilling adverse market dynamics in these countries.

11 It should be noted that the bond and stock price shocks in this scenario are assumed to be confined to the euro area countries, meaning that potential contagion to other countries (such as emerging market economies) has not been considered.

12 The valuation haircuts are calibrated to the new levels of government bond yields, using the sovereign debt haircut methodology applied in the EBA's 2011 EU-wide stress test (see the ECB note entitled "Annex 4: Guidance for calculation of losses due to application of market risk parameters and sovereign haircuts", 18 March 2011, available on the EBA's website).

13 The same simulation procedure as that used for calibrating long-term bond yield shocks across countries has been applied at the euro area level to the three-month EURIBOR.

14 Based on estimated regressions of CDS spreads on long-term government bond yields.

15 The macroeconomic impact is derived by a multi-country, EU-wide simulation tool, based on impulse response functions and incorporating intra-EU trade spillovers.

by up to 0.7 percentage point in 2012 and by close to 1.7 percentage points in 2013, again as compared with the baseline.

In addition, the aggravation of the sovereign debt crisis assumed in this scenario would be likely to increase the process of bank deleveraging in the euro area. First and foremost, sovereign distress may aggravate banks' concerns about their access to wholesale funding over the medium term. Second, the financial shocks, and the accompanying slowdown in economic activity assumed in this scenario, would probably lead to a reduction or reversal of deposit flows.¹⁶

Accordingly, euro area banks are assumed to be able to refinance only 50% of the wholesale funding maturing in the period 2012-13. Moreover, deposit outflows have been calibrated on the basis of sovereign riskiness (using credit ratings).¹⁷ Overall, this creates a gap in banks' balance sheets that needs to be corrected. The limited access to overall funding will, however, have different implications for the asset-side adjustment, depending on the funding source that is being constrained.

Funding gaps stemming from wholesale funding will induce banks to shed primarily more liquid (non-loan) assets, in particular government bonds, which may, in turn, trigger a "fire sale" process of deleveraging that is assumed to be completed within one year.¹⁸ Only 35% of the wholesale funding gap is assumed to be covered via the loan book. Deposit outflows are assumed to translate one-for-one into loan reductions (via a non-renewal of maturing loans).

The estimates of the loan deleveraging process are derived under the assumption that banks follow a pecking order when adjusting their balance sheets. More specifically, it is assumed that banks first shed assets outside the euro area, starting with leveraged and project finance loans, followed by euro area assets located outside their domestic markets in the order of country risk (measured by the prevailing sovereign credit rating) and, ultimately, by assets in their home countries.

The loan deleveraging would be expected to have negative implications for economic activity. The magnitude of such effects is illustrated below, but the potential feedback effects on the banking sector have not been explicitly incorporated in the scenario, which thus tends to slightly underestimate the overall negative repercussions on banks' solvency positions.

ADVERSE SHOCK TO EURO AREA ECONOMIC ACTIVITY

The second scenario considered here is based on a sizeable negative demand and stock price-driven shock in the euro area arising from a change in the global growth outlook, combined with continued uncertainty surrounding the euro area sovereign debt crisis. This would lead to a recession in many euro area countries in 2012 and to an only slow recovery in 2013. Spillover effects to the global economy have not been considered.

*Access to wholesale
funding markets
will be limited...*

*... forcing banks to
initially shed more
liquid assets...*

*... ultimately
leading to loan
deleveraging*

*The second scenario
is based on a
negative demand
and stock price
shock*

¹⁶ Deleveraging incentives derived from banks' capital positions, in particular those stemming from the EBA's EU Capital Exercise, are not explicitly treated in the scenario.

¹⁷ Deposit outflows were calibrated on the basis of observed changes in deposits between the second quarter of 2010 and the second quarter of 2011 (using the Consolidated Banking Statistics). Countries were grouped into categories on the basis of their sovereign credit rating. The assumed deposit outflows thus range from 20% for banks in countries rated below investment grade to 0% for banks in AAA-rated countries.

¹⁸ The impact of the assumed fire sales of liquid assets on the profit and loss statements is simulated via a country-specific shock to bond yields that is equal to 99th percentile of the simulated 20-day forward distribution of bond yields (cut-off date: mid-May 2012). To calculate the impact on the value of individual banks' securities holdings, the sovereign exposures reported in the context of the EBA's 2011 EU-wide stress test were used. If banks do not have enough sovereign bonds, they must divest other securities at a haircut that is assumed to be 20% larger than the haircut on sovereign debt.

Table 4.2 Key drivers impacting euro area GDP under the adverse scenarios

	Key assumptions driving the impact on GDP
Contagion and deleveraging shock	An aggravation of the sovereign debt crisis fuelling increases in interest rates and stock price declines amid a broad-based bank deleveraging process
Domestic demand shock	Adverse shock to euro area domestic demand

The adverse shock considered in this analysis is based on an exogenous shock to stock prices and domestic demand comparable to that applied under the adverse scenario of the EBA's 2011 EU-wide stress test, albeit with a different path and timing.

The impact of the domestic demand shock translates into an overall euro area real GDP growth deviation of -1.4 percentage points from baseline in 2012, and into one of -0.7 percentage point in 2013, which implies a recession in 2012. The real economic impact differs considerably across countries, reflecting, among other things, differences in their degree of openness to trade.

Summarising the two adverse scenarios, Tables 4.2 and 4.3 display the key driving factors, as well as the overall impact on euro area GDP, in percentage point deviations from baseline levels. The baseline scenario is based on the EU Commission's spring forecast of May 2012. Euro area GDP growth is projected to be 1.5% in 2011, -0.3% in 2012 and 1.0% in 2013.

IMPACT ON LCBGS' SOLVENCY POSITIONS UNDER THE BASELINE AND THE ADVERSE SCENARIOS

On the basis of the two specific scenarios described above, the impact on euro area banks' profit and loss statements and, ultimately, on their solvency positions is estimated by projecting the main variables that determine the banks' solvency, such as credit risk parameters, profits and risk-weighted assets.

The balance sheet and the profit and loss data are based on published financial reports of 17 euro area LCBGs. In addition, supervisory information disclosed in the context of the EBA's 2011 EU-wide stress test and the EBA's 2011 EU Capital Exercise is taken into account.¹⁹

Moreover, the following assumptions are made:

- (1) Banks' credit risk – expressed in terms of changes to the probability of default (PD) and the loss-given-default (LGD) – is estimated by exposure types, differentiating between loans to non-financial corporations, retail loans and commercial real estate loans.²⁰ The projected changes at the country level are then applied to the bank-specific loss rates reported in the EBA's 2011 EU-wide stress test.

¹⁹ The data are provided at the consolidated banking group level. Bank balance sheets are assumed to be static over the simulated horizon, except when explicitly assumed otherwise, e.g. in the contagion and deleveraging scenario.

²⁰ The forecasting methodology applies an autoregressive distributed lag framework to model PDs and loss rates across sectors and countries, which is based on a satellite multi-equation model set-up at the euro area level, through which country-specific macroeconomic scenario assumptions are fed in to obtain an internally consistent set of PD/LR parameters under both the baseline and the adverse paths.

Table 4.3 Overall impact on euro area GDP under the baseline and the adverse scenarios

(2011 – 2013; percentage and percentage point deviations from baseline levels)			
	2011	2012	2013
Baseline (<i>annual growth rate</i>)	1.5	-0.3	1.0
<i>Percentage point deviations from baseline growth rate:</i>			
Contagion and deleveraging shock scenario		-0.2	-0.7
Euro area domestic demand shock scenario		-1.4	0.7
Joint scenario		-1.5	-1.2
Sources: ECB and ECB calculations.			

- (2) For exposures to sovereigns and financial institutions in the banking book, provisioning is generally based on rating-implied PDs similar to those in the EBA exercise.²¹ The only exception are Greek sovereign exposures, for which a 75% loss rate is used.
- (3) Expected losses are calculated as the product of each bank's outstanding loans to each sector and the corresponding PDs and LGDs.
- (4) Banks' net interest income is calculated using loan-deposit margin multipliers to assess the impact of interest rate changes.²² The changes in short-term loan and deposit rates are then multiplied by the outstanding amounts of loans and deposits for each bank at end-2010. Moreover, some banks operate with a substantial funding gap, which implies that part of their loan portfolio needs to be refinanced at higher money market rates.²³ To account for the marginal pricing of deposit rates, which have risen strongly in many euro area countries in recent years, changes in the short-term rate have been adjusted by adding the spread between the three-month money market rate and new business time deposit rates at country level as of end-September 2011.
- (5) Trading income developments are assumed to correspond, for each bank, to average trading income over the last five years (2006-10) under the baseline scenario, and to the average of the three financial crisis years (2008-10) under the adverse scenarios. Income related to fees and commissions is assumed to remain constant in nominal terms.
- (6) Tax and dividend assumptions are bank-specific, using the average ratio of positive tax payments over pre-tax profits in the period from 2008 to 2010 and the median dividend-to-net income ratio over the same period.
- (7) Risk weighted assets (RWAs) are also calculated at the bank level, with RWAs defined according to the so-called Basel 2.5 (CRD III) framework, i.e. including higher risk weights on re-securitisations in the banking book and certain market risk elements in the trading book.²⁴

Having computed the effect of the different aforementioned shocks on the various balance sheet components, the overall impact is assessed on the basis of core Tier 1 capital ratios.

Under the baseline scenario, euro area LCBGs' core Tier 1 capitalisation is projected, on average, to increase from 8.7% at end-2011 to around 9.3% at end-2013 (see Chart 4.22).²⁵ This reflects both a decrease in RWAs due to a recalibration of internal models and positive retained earnings.²⁶ Under the baseline scenario, euro area banks would, on average, comply with the core Tier 1 requirements set out in the EBA's EU Capital Exercise, even without the temporary sovereign buffer, although the average masks substantial variations across individual banks and euro area countries.

Under the baseline scenario, the average core Tier 1 ratio is projected to increase from 8.7% to 9.2% at the end of 2013

21 Similar to the approach taken in the EBA's 2011 EU-wide stress test (see EBA, "2011 EU-wide Stress Test: Methodological Note – Additional Guidance", June 2011).

22 The methodology applied to estimate the coefficient multipliers was presented in Box 7 of the December 2010 FSR. See also Box 13 of the June 2009 FSR for further details.

23 As a conservative assumption, it is assumed that the increase in national sovereign CDS spreads from December 2010 to mid-May 2012 remains constant over the simulation horizon and is passed through one-for-one to the costs of market-based debt refinanced, and thus adds to the net interest payments banks will have to honour. To avoid unreasonably strong impacts, the increase in CDS spreads was capped at 200 basis points.

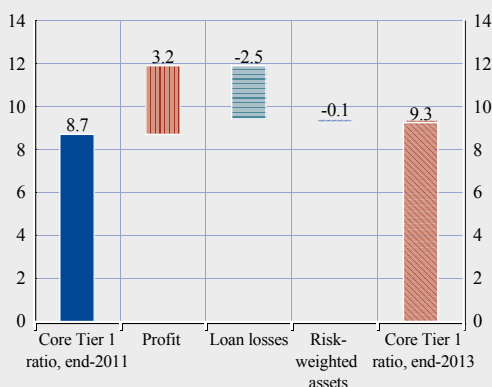
24 On average in the euro area, this decreases the core Tier 1 capital ratio by 0.5 percentage point in comparison with Basel II. The impact is, however, concentrated mainly on some of the larger banks that have large trading books and investment bank activities.

25 The figure of 8.7% is a weighted average based on end-September 2011 EBA disclosures. The number is rather high on account of the weight of relatively large banks in the sample, which tend to have relatively high core Tier 1 capital ratios.

26 Under the baseline scenario, bank balance sheets are assumed to be static over the simulated horizon.

Chart 4.22 Average contribution of profits, loan losses and risk-weighted assets to the core Tier 1 capital ratios of euro area LCBGs under the baseline scenario

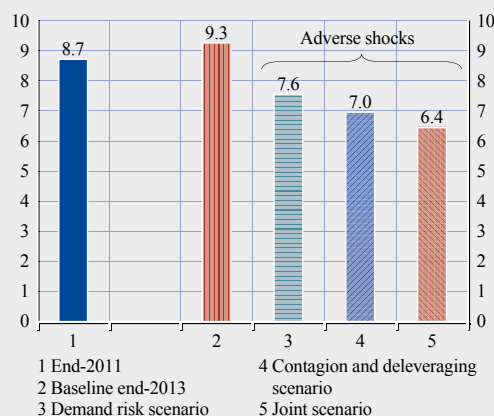
(percentage (core Tier 1 ratio) and percentage point contributions)



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

Chart 4.23 Average core Tier 1 capital ratios of euro area LCBGs under the baseline and adverse shock scenarios

(2011 – 2013; percentages)



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

The end-2013 impact on LCBGs' solvency positions under the two adverse scenarios, as well as under the joint scenario, is summarised in Chart 4.23.

Under the demand shock and the contagion/deleveraging scenarios, the average core Tier 1 capital ratios decline to 7.2% and 6.6% respectively by the end of 2013

The demand shock and the contagion and deleveraging shock scenarios both imply a generalised decrease in core Tier 1 capital ratios across the euro area banking sector. Based on the assumptions outlined above, the euro area average core Tier 1 capital ratio under the two scenarios would decline to 7.6% and 7.0% respectively by the end of 2013, i.e. they would be between 1.1 and 1.7 percentage points lower respectively than under the baseline scenario.

The main driving factors behind the decline in the capital ratio in comparison with the baseline scenario under both scenarios are the increase in loan losses and lower retained earnings (see Chart 4.24). Under the demand shock scenario, the increase in loan losses is relatively larger on account of the somewhat more severe projections for economic activity, whereas the decline in profits is relatively stronger owing to marking-to-market and fire-sale losses under the contagion and deleveraging scenario.

The joint scenario combining the two adverse scenarios produces even stronger negative results, with the average core Tier 1 capital ratio in the euro area falling to just 6.4% by the end of 2013.

Combining the two adverse scenarios leads to an average core Tier 1 capital ratio of 6.1% at the end of 2013. The "sovereign buffer" accumulated in the EU Capital Exercise increases average core Tier 1 capital ratios by 0.4 percentage point

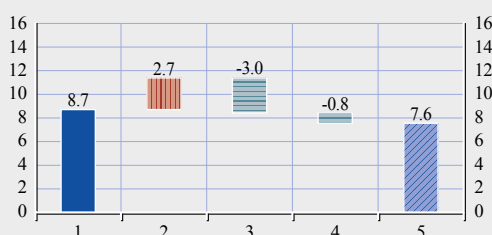
Taking into account the capital to be accumulated as part of the EU Capital Exercise to build a temporary "sovereign buffer", the average euro area core Tier 1 capital ratio under the contagion and deleveraging scenario increases by 0.4 percentage point to 7.4%. Under the demand shock and the joint scenarios, it would increase to 8.0% and 6.8% respectively. In addition, banks will also accumulate more capital up to the finalisation of the EU Capital Exercise at the end of June 2012 in order to comply with the 9% threshold for the core Tier 1 capital ratio, so that their ability to withstand shocks should increase even further.

To rank the systemic risks considered in the various scenarios, it is not sufficient to focus solely on the solvency-implied results derived under each scenario. In addition, the probability of occurrence attached to each of the scenarios should be considered. Against this background, it is useful to consider the size of shock needed to drive the LCBGs' median core Tier 1 capital ratio down to

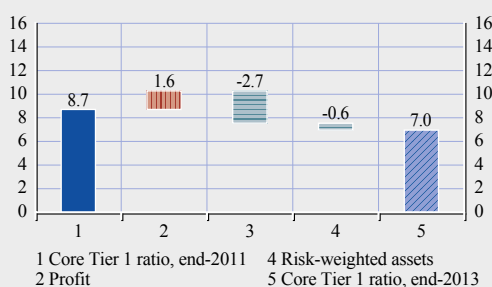
Chart 4.24 Average contribution of profits, loan losses and risk-weighted assets to core Tier 1 capital ratios of euro area LCBGs under the adverse scenarios

(2011 – 2013; percentages (core Tier 1 capital ratio) and percentage point contributions)

Demand risk scenario



Contagion and deleveraging scenario



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

a pre-specified threshold; in other words, a reverse-type of stress test is made.²⁷ For instance, considering a threshold core Tier 1 ratio of 6%, the effects of the demand risk scenario and the contagion and deleveraging scenario would both need to be multiplied by a factor of 4, while the multiplier under the joint scenario would be slightly below 2.

The above-mentioned impacts on bank solvency ignore the second-round effects of the assumed shocks on the overall economy that would follow from the shocks to the loan supply implied in the contagion and deleveraging scenario (and in the joint scenario) via limited access to bank funding. The macroeconomic implications of the implied loan deleveraging can be gauged from credit-GDP multipliers estimated in macro models. Use of a number of the ECB's macroeconomic models would suggest a reduction of output growth in the order of between 0.4% and 0.7% at the aggregate euro area level by the end of 2013, even though euro area LCBGs represent only a subset of the whole banking sector.²⁸ Such adverse macroeconomic implications would be expected, in turn, to exert further downward pressure on banks' solvency positions, through

higher loan losses and reduced profitability. Notably, these effects do not take into account any (cross-border) loan deleveraging that might occur in the context of the ongoing EU Capital Exercise.

Finally, it is worth noting that the solvency-based results do not take into account potential beneficial effects arising from the Eurosystem's three-year LTROs of December 2011 and February 2012. A direct positive implication for banks resorting to the three-year LTROs would be a reduction of their funding costs, to the extent that the liquidity obtained replaces the more costly wholesale funding to be refinanced over the three-year horizon. The average positive impact of the reduced funding costs on the core Tier 1 capital ratios of the banks considered in this report (i.e. not all the banks that took recourse to the three-year LTROs of December 2011 and February 2012) can be estimated to amount to between 0.2 and 0.6 percentage point, with the size depending, inter alia, on the usage of the acquired liquidity.²⁹ This direct impact would be largely similar across the baseline and the adverse scenarios. It does not, however, consider the relief in terms of possibly lower deleveraging needs.

²⁷ To derive the factor ("multiple") that is needed for each scenario to reach a median core Tier 1 capital ratio equal to 6% by end-2013, the amplified macro model output is fed through the PD and profit satellite models, which are linked to LCBGs individual balance sheets.

²⁸ The models used were those in M. Darracq Parias, C. Kok and D. Rodriguez Palenzuela, "Macroeconomic propagation under different regulatory regimes: Evidence from an estimate DSGE model for the euro area", *International Journal of Central Banking*, December 2011; L. Cappiello, A. Kadareja, C. Kok and M. Protopapa, "Do bank loans and credit standards have an effect on output? A panel approach for the euro area", *ECB Working Paper Series*, No 1150, 2010; and T. Banbura, T. Giannone, and R. Reichlin "Large Bayesian Vector Auto Regressions," *Journal of Applied Econometrics*, 25(1), 2011.

²⁹ The reduction in wholesale funding costs has been calculated as the difference between the country-specific CDS bank spreads and 1%. This is multiplied with the amount of maturing wholesale funding that is being replaced by LTRO funds. The funding cost relief does not take into account the haircuts applied to the collateral pledged by the banks at the central bank. The impact of asset purchases is derived from the "carry-trade" gain of investing in two-year domestic government bond yields (the average January 2012 yield has been applied), while the profitability impact of loan extensions has been derived using December 2012 composite bank lending rates to non-financial corporations.

Macro-economic second-round effects cause output growth to fall by between 0.4% and 0.7% by the end of 2013

The LTROs' impact on banks' funding costs increase average core Tier 1 capital ratios by between 0.2 and 0.6 percentage point

Insurers' performance continuously modest but stable...

... although natural catastrophes caused large losses in 2011

4.2 GENERALLY RESILIENT EURO AREA INSURANCE SECTOR

4.2.1 FINANCIAL CONDITION OF LARGE INSURERS³⁰

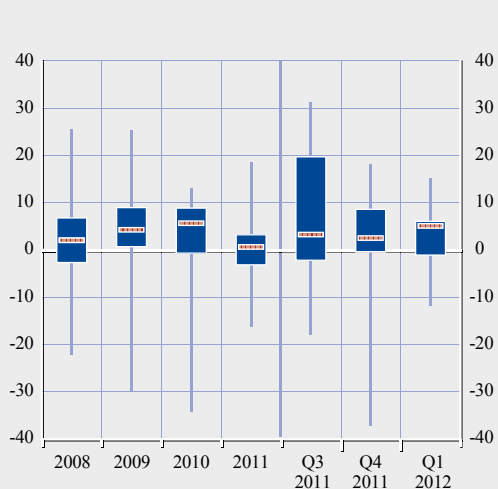
The performance of large primary insurers in the euro area continued to be broadly stable in terms of profitability and capital positions in the last quarter of 2011 and the first quarter of 2012. However, underwriting performance continued to be moderate on account of modest economic activity. Competitive pressures continued in certain non-life insurance markets and also extended to life insurance products, which were faced with increased competition from the banking sector for funds – resulting in substitution of life insurance products by bank deposits in some euro area countries. As a consequence of all these factors, growth of gross premiums written remained subdued during the past two quarters (see Chart 4.25).

Several natural disasters and impairments on selected financial assets dampened profitability of euro area insurers in 2011. The combined ratios of large primary insurers, encapsulating incurred losses and expenses as a proportion of earned premiums, rose sharply in the fourth quarter, but fell back to below 100% in the first quarter of 2012 for all insurers in the sample, thereby signalling a return to profitable underwriting. Whereas the bulk of the Greek exposure write-downs took place in the third quarter of 2011, investment income and return on equity have stabilised somewhat since then, suggesting that any additional impairments were offset by realised returns from sales of highly priced government bonds and by improved financial market conditions in the first quarter of 2012 (see Chart 4.26).

30 The analysis is based on a sample of 19 listed primary insurers with total combined assets of about €4.3 trillion, representing 60% of the gross premiums written in the euro area insurance sector, and on a sample of three reinsurers with total combined assets of about €310 billion, representing about 30% of total global reinsurance premiums. Quarterly data were only available for a sub-sample of these insurers.

Chart 4.25 Growth of gross premiums written for selected large euro area primary insurers

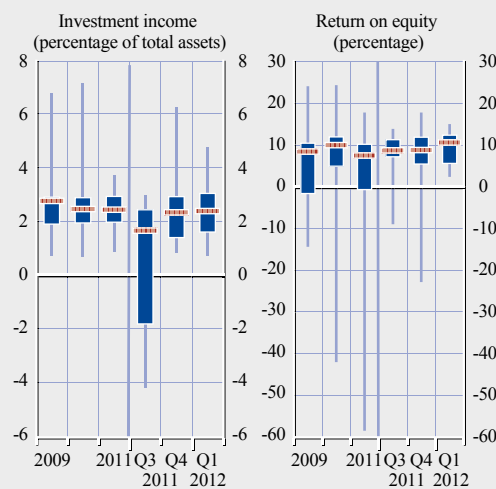
(2008 – Q1 2012; percentage change per annum; maximum, minimum, interquartile distribution and median)



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

Chart 4.26 Investment income and return on equity for selected large euro area primary insurers

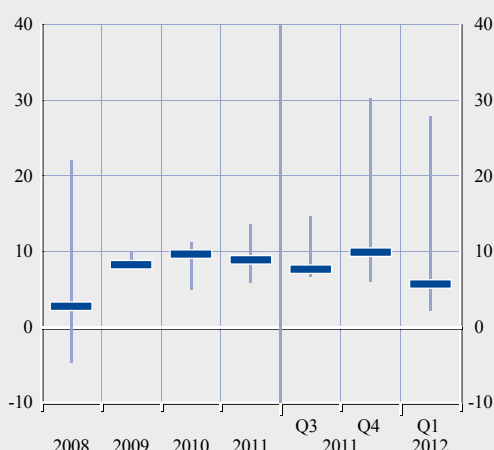
(2009 – Q1 2012; maximum, minimum, interquartile distribution and median)



Sources: Bloomberg, individual institutions' financial reports and ECB calculations.
Note: The quarterly data are annualised.

Chart 4.27 Growth of gross premiums written for selected large euro area reinsurers

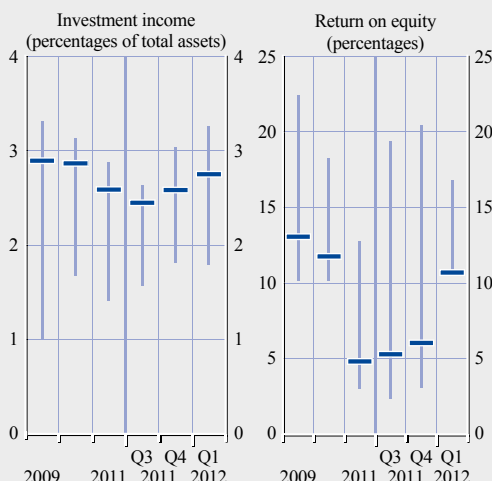
(2008 – Q1 2012; percentage change per annum; minimum-maximum distribution and weighted average)



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

Chart 4.28 Investment income and return on equity for selected large euro area reinsurers

(2009 – Q1 2012; minimum-maximum distribution and weighted average)



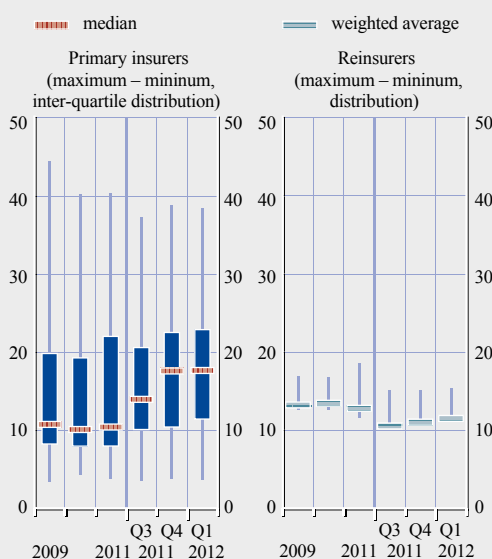
Sources: Bloomberg, individual institutions' financial reports and ECB calculations.
Note: The quarterly data are annualised.

As in the case of primary insurers, the financial performance of large euro area reinsurers also remained stable in late 2011 and early 2012. This was partly attributable to significant premium rate increases as from mid-2011, combined with the solid demand for reinsurance resulting from a surfeit of accumulated natural disasters. Insured losses, including those from floods in Thailand, resulted in a rebound of the average combined ratio to over 100% for the year 2011, thereby suggesting losses in excess of premiums over this period. The first quarter of 2012 has again seen a significant decline of combined ratios to below 100% for all reinsurers in the sample. Aside from improvements in underwriting performance and the growth in premiums written, positive returns on equity stemmed from improved investment income (see Chart 4.27 and Chart 4.28).

Despite the toll taken by natural catastrophes, the capital buffers of large euro area insurers still seem to include a reasonable amount of shock-absorption capacity (see Chart 4.29).

Chart 4.29 Capital positions for selected large euro area insurers

(2009 – Q1 2012; percentage of total assets)



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

Capital buffers still there although possibly inflated

At the same time, the current low yields on highly rated government bonds tend to inflate insurance assets and, consequently, capital – with an implied potential to undermine comfortable capital positions. The impact is likely to be highest in those jurisdictions where liabilities are not marked to market.³¹

4.2.2 INSURANCE SECTOR OUTLOOK AND RISKS

The financial condition of large euro area insurers is, on average, likely to remain broadly stable during the next six to 12 months. The outlook may, however, involve a high level of heterogeneity across the individual institutions and euro area countries.

Stable financial condition...

... with investment and underwriting risks, however...

The most significant challenges for the sector relate to investment and insurance underwriting activities, which are strongly impacted by global and euro area growth prospects and financial market developments. Low yields on highly rated government bonds continue to constrain profitability, while increased competition for funds from banks may impact life insurance profitability. As regards solvency, volatility in the form of a sudden increase in highly rated government bond yields could impact asset valuations and capital of the industry, particularly given already thin capital buffers in some cases.

... mitigated by adjustment of premiums and capital raising

Mitigating factors include possibilities to increase the prices of insurance products and to raise capital in the markets. As regards the latter, the recent rating downgrades and a negative outlook on the basis of the low-yield environment and sovereign risk in Europe are bound to make recapitalisation efforts increasingly expensive also for the insurance sector, which has thus far been far less exposed to negative market attention than banks.

EARNINGS OUTLOOK

Analyst expectations and market indicators are positive

Analysts expect insurance earnings to improve during 2012 (see Chart 4.30). Market-based indicators for insurers point to continued volatility in the sector. Euro area insurers' credit default swap (CDS) spreads and their dispersion across institutions narrowed until March, before starting to widen again (see Chart 4.31). The average stock prices of insurance companies in mid-May 2012 stood around the levels seen in mid-November 2011.

Upside potential in pricing and investments...

Upside potential for profitability relates to pricing of non-life insurance products and to market developments in investment income. Following the catastrophe-laden year 2011, a trend towards increases in tariffs for catastrophe-related products is likely to continue in the near term. The demand for reinsurance is likely, in addition, to profit from the adoption of risk-based capital requirements under the Solvency II regime and from the ensuing expected increase in demand for reinsurance for risk-management purposes.

... versus risks in economic outlook, low yields and competition

Downside risks to profitability include an uncertain economic outlook, the possible persistence of the low-yield environment and increased competition from banking products. First, weak economic growth may translate into sluggish demand for primary insurance, low pricing potential and increasing credit risk in corporate bond markets. Second, the low yields on highly rated government bonds constitute a high risk for profitability, especially in light of the minimum guarantees that some insurers offer to their policyholders, although these are declining.³² Third, increased competition

³¹ Large, listed euro area insurers generally follow the International Financial Reporting Standards (IFRSs), which ensure a uniform treatment of financial assets (depending on their respective accounting classification), but (currently) not of insurance liabilities.

³² For a discussion of the impact on insurers of low risk-free interest rates, see Box 16 in ECB, *Financial Stability Review*, June 2010. Evidence of declining guarantees can be found in the first half-yearly Financial Stability Report 2011 published by EIOPA, available at <https://eiopa.europa.eu/publications/financial-stability/index.html>. The diminishing guarantees apply to all EIOPA member countries that have reported data for the survey, except for Finland, Malta and Sweden.

Chart 4.30 Earnings per share (EPS) for selected large euro area insurers and real GDP growth

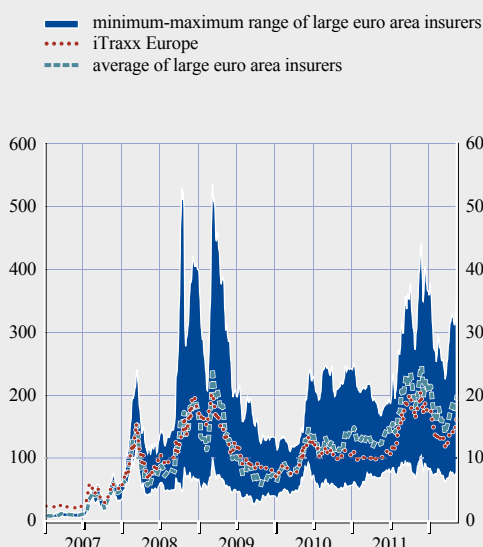
(Q1 2002 – Q4 2012)



Sources: European Commission, Thomson Reuters and ECB calculations.

Chart 4.31 CDS spreads for a sample of large euro area insurers and the iTraxx Europe main index

(Jan. 2007 – May 2012; basis points; five-day moving average; five-year maturity; senior debt)



Sources: Bloomberg and JPMorgan Chase & Co.

from bank deposits and the high deposit rates offered in some countries may also lead to further outflows from life insurance in countries with high market funding strains, as already manifested by the modest growth of premiums written (see Chart 4.25). A continuation of this trend could impact the profitability of the industry in the forthcoming quarters.

INVESTMENT RISK

Large euro area insurers exhibit a high exposure to government and corporate bond markets, contrasting with a low aggregate exposure to equity, structured credit and commercial property. The government bond market in particular has shown lower levels of uncertainty since the publication of the December FSR (see Charts 4.32 and 4.33).

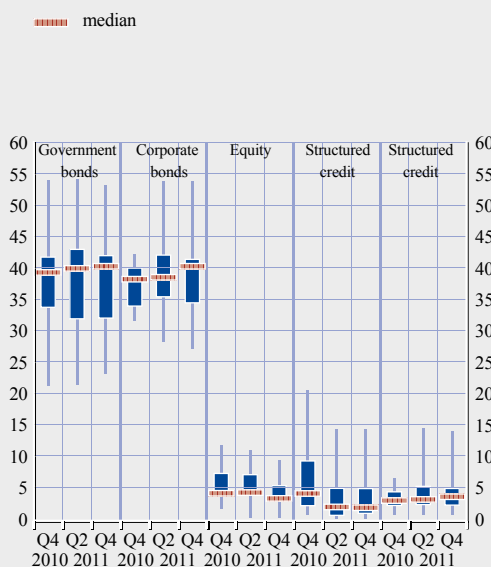
In general, euro area insurers should benefit from some recent normalisation of conditions in the **government bond markets**, but are vulnerable to a solvency risk that could materialise in the event of a sudden rise in yields on highly rated government bonds. This is because a yield increase could result in a significant decrease in the valuation of assets, given the predominant position of highly rated government bonds in insurers' investment portfolios. The gradual move towards a market-consistent approach across jurisdictions on the eve of the Solvency II regime will mitigate the impact of a sudden rise in yields over time, as a higher discount rate implied by an increase in long-term yields would also reduce the value of liabilities in jurisdictions where these are marked to market. The potential persistence of low yields on highly rated government bonds is, by contrast, not considered a major solvency risk for the next six to 12 months for the large euro area insurers on the aggregate. Nevertheless, important differences across the industry prevail, and insurers in those jurisdictions where liabilities are marked to market are more at risk than the others. Finally, although insurers' investment exposures to lower-rated government bonds appear, in aggregate, to be manageable and diminishing over time, a further deterioration in the credit

Government and corporate bond markets key for investment risk

Solvency can be impacted by a sudden rise in government bond yields

Chart 4.32 Investment mix for selected large euro area insurers

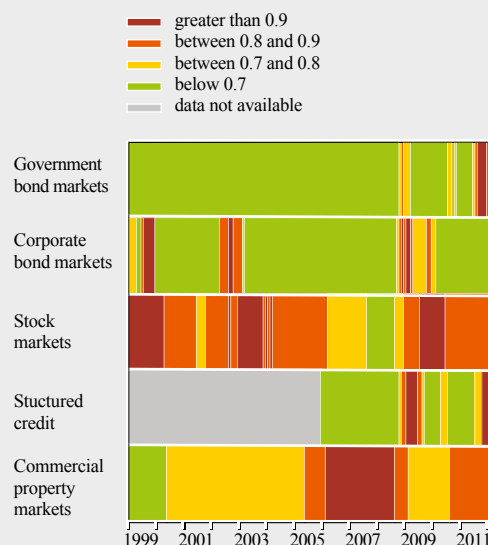
(H2 2010 – H2 2011; percentage of total investments; maximum, minimum and interquartile distribution)



Sources: JPMorgan Cazenove, individual institutions' financial reports and ECB calculations.
Notes: Based on consolidated financial accounts data. The equity exposure data exclude investment in mutual funds.

Chart 4.33 Investment uncertainty map for euro area insurers

(Jan. 1999 – Apr. 2012)



Sources: ECB, Bloomberg, JPMorgan Chase & Co., Moody's, Jones Lang LaSalle and ECB calculations.
Notes: The chart shows the level of each indicator compared with its "worst" level (i.e. its highest or lowest level, depending on what is worse from an insurer's investment perspective) since January 1999. An indicator value of one signifies the worst conditions in that market since January 1999. "Government bond markets" is the euro area ten-year government bond yield and the options-implied volatility for ten-year government bond yields in Germany; "Corporate bond markets" is the average of euro area A-rated corporations' bond spreads and the actual and forecast European speculative-grade corporations' default rates; "Stock markets" is the average of the index level and the price/earnings ratio of the Dow Jones EURO STOXX 50 index; "Structured credit" is the average of euro area residential mortgage-backed securities and European commercial mortgage-backed securities spreads; and "Commercial property markets" is the average of the average euro area commercial property capital values and value-to-rent ratios. For further details on how the uncertainty map is created, see Box 13 in ECB, *Financial Stability Review*, December 2009.

quality of some lower-rated sovereign bond issuers could impact balance sheets through marking-to-market valuation declines and challenge, in particular, the solvency of insurers that are exposed to the countries and sectors most affected by the current crisis.

Increasing corporate bond exposures

A noticeable increase in **corporate bond** holdings in the investment portfolios of large euro area insurers has been seen in recent months (see Chart 4.32). The higher exposure to this asset class may imply increased credit risk stemming from relative macroeconomic weakness. Possible rating downgrades of highly rated corporate bonds could also risk forced selling on account of regulatory restrictions on insurance investments below the upper scale of ratings, possibly with a loss. Within the class of corporates, insurers remain particularly exposed to developments in the banking sector. Holdings of debt securities issued by euro area monetary financial institutions represented 23% of insurers' and pension funds' total holdings of debt securities and 9% of their total financial assets in the fourth quarter of 2011.

There are several factors that may imply a changing allocation of insurance investment portfolios in the future. On the one hand, this may result from changing bank bond issuance patterns resulting from changing funding strategies on their part, together with sovereign strains in the euro area in a low-yield environment. This might imply structurally higher investment in non-financial corporate bonds, as well as in markets for equity, commercial property and structured credit that currently feature less prominently in the investment mix (see Chart 4.32). On the other hand, the risk-adjusted capital requirements of the forthcoming Solvency II regime will set incentives for insurance companies to invest in government bonds and covered bonds, whereas asset classes like equity and securitised products will become less attractive.³³ Finally, the ongoing deleveraging in the banking sector may also offer investment opportunities for insurance companies insofar as it results in asset acquisition opportunities.

Although the final outcome of these various short-term and long-term forces is uncertain, the incentives for insurers may support the disintermediation of financing away from banks, as insurers may increasingly invest in the real economy, instead of in banking products. Some insurers have indeed already reported having shifted their portfolios away from highly rated, low-yielding sovereign bonds towards corporate bonds or project financing. These developments have the potential to alleviate the refinancing risk of corporates discussed in Section 2.2. Small and medium-sized enterprises, however, are unlikely to be the primary beneficiaries of this move, given the traditionally cautious investment policies of insurers and the regulatory restrictions they face in terms of asset riskiness.

Finally, certain banking-type activities conducted by insurers in the field of credit risk protection also have the potential to endanger financial stability and need to be monitored, although their extent is currently modest.³⁴ The recent initiatives on shadow banking and global systemically important insurers are welcome in that they focus on these issues.

UNDERWRITING RISK

Solvency risks for insurers on the liabilities side are closely related to the insurance underwriting activity in two key ways.

First, for non-life insurers, underwriting risks relate to the potential for limited buffers to absorb further unforeseen losses, following high natural disaster-related claims. Estimates of insured catastrophe losses in 2011 currently total €116 billion, the highest figure since 2005 (see Chart 4.34). The earthquakes in Japan and New Zealand, in particular, revealed the extent to which the earthquake risk models underestimated the losses resulting from secondary sources, such as tsunami damage and business interruption. The above-average Atlantic hurricane season also contributed markedly to the insured catastrophe losses (see Chart 4.35).

The relatively high incidence of natural catastrophes in 2011 has reduced capital buffers, which could in some cases entail a material solvency impact in the case of further catastrophes. The potential price increases discussed could mitigate such solvency risk. Corrections to the catastrophe models as regards secondary damage costs are likely to support price increases further in the field of natural catastrophe insurance.

A second underwriting risk relates to life insurers and increased competition for funds from the banking sector. That said, increases in life insurance lapse rates in some jurisdictions and difficulties

Potential for more changes in structural allocation

... may support disintermediation

Risks from credit risk protection remain small

2011 was the most expensive catastrophe year since 2005

Reduced capital buffers

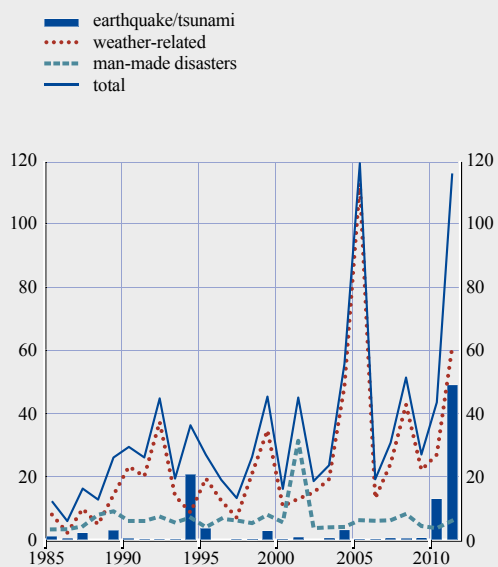
Increased competition not an acute solvency risk

³³ See Section 4.3.2 in the December 2011 FSR for a more thorough discussion.

³⁴ See Box 13 on credit risk protection by insurance companies in the December 2011 FSR.

Chart 4.34 Insured catastrophe losses

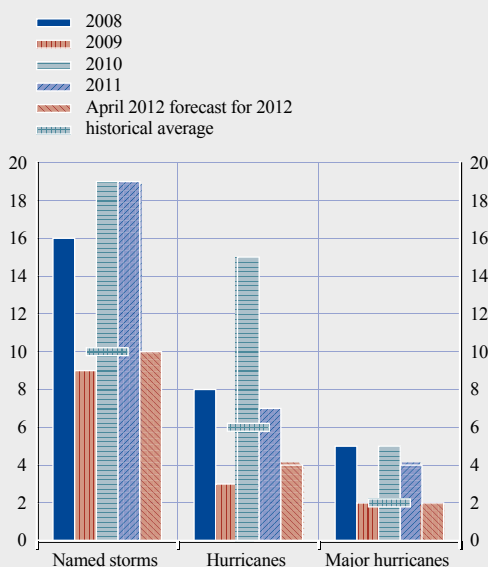
(1985 – 2011; USD billions)



Source: Swiss Re.

Chart 4.35 Atlantic hurricanes and storms

(2008 – 2012; number of hurricanes and storms)



Source: Colorado State University.

in attracting new business more generally are not considered a threat to solvency in the short term.³⁵ However, should the lapse rates increase further to a level that would start impacting the liquidity position of an insurer, they could induce asset “fire sales”, which could also have an impact on solvency in the current market situation. Recent financial innovations in the field of liquidity transfers from banks to insurers, such as liquidity swaps, may compound any such effect and should therefore be monitored closely.

4.2.3 ASSESSING THE RESILIENCE OF EURO AREA INSURERS

The major investment risks identified in the previous sections are quantified in this section in order to assess the potential impact on large euro area insurers³⁶ should the risks materialise. More specifically, the following market and credit risks are assessed: an increase in interest rates, a fall in equity and property prices, a deterioration of the creditworthiness of borrowers through growth in credit spreads for marketable instruments and an increase in loss rates for loan portfolios.

This analysis for the insurance sector³⁷ allows an assessment of the possible implications of the above-mentioned risks using the adverse macroeconomic scenarios described in Section 4.1.3. The risks are transmitted through two channels: (i) valuation effects on financial securities owing to changes in prices; and (ii) the credit quality of loan portfolios.

The exposures of the insurance companies analysed in this section are to a great extent similar to those at the end of 2011. The analysis assumes that the market values of shares, bonds and property

Major risks are quantified...

... under the scenarios from Section 4.1.3

Assessment is made of insurers' exposures as at end-2011...

³⁵ In fact, the immediate direct effect of increasing lapses would be an increase in solvency through decreased liabilities.

³⁶ The exercise is based on a sample of 13 major insurance groups in the euro area.

³⁷ The exercise is not related to the EU-wide stress tests in the banking and insurance sectors coordinated by the European Banking Authority (EBA) and the European Insurance and Occupational Pensions Authority (EIOPA) respectively.

decrease sharply and abruptly, with effects occurring instantaneously before institutions have an opportunity to react and adjust their portfolios.³⁸ The assessment of the credit risk in the insurers' loan books follows the scenario-based estimation procedure of the assessment of the resilience of euro area banks.

A number of simplifying assumptions had to be made for this exercise. First, available granular data (e.g. for financial instruments, investments in sovereigns by jurisdiction, investments in corporates by credit rating³⁹) were used whenever possible, but in some instances broad aggregates of financial investments were used. The relative weights of various investments by instrument are shown in Chart 4.32. Second, no hedging or other risk-mitigation measures were taken into account, which means that some losses might be overestimated. Unit-linked financial investments⁴⁰ were excluded from the scope of the exercise. Third, all other income and expenses except those analysed within this framework were assumed to be fixed. Fourth, the credit risk assessment is carried out using aggregate loan portfolios only and the EBA's reported average loss rate of the retail and corporate portfolios of banks domiciled in the home country of the insurance group under consideration.

Table 4.4 summarises the main parameters applied in the assessment of the resilience of euro area insurers under the demand risk scenario and the contagion and deleveraging scenario. Haircuts for debt securities were generally derived from implied changes in the value of hypothetical representative securities after the assumed increases in interest rates were applied. The haircuts were applied uniformly across the sample of large euro area insurers.

The government bond portfolio valuation haircuts were estimated on the basis of representative euro area sovereign bonds of five-year maturity. Under the demand risk scenario, the haircuts for the government bonds reflected an actual change in corresponding yields from end-2011 to 15 May 2012, with a limitation of no positive gains. An additional widening of long-term government bonds yields by 205 basis points on average in the euro area was introduced under the contagion and deleveraging scenario.

Haircuts for corporate bonds were derived from implied changes in the value of a hypothetical average security having the characteristics of the representative market index of bond portfolios.⁴¹ The pricing of corporate bonds was additionally⁴² influenced by a widening of credit spreads.⁴³ On average, the simulated response of credit spreads on corporate debt securities equals 201 basis points. Finally, picking only the most severe parameter from the macro scenarios, stock prices were

Table 4.4 The parameters for the assessment of the resilience of euro area insurers

	Demand risk shock scenario	Contagion and deleveraging shock scenario
Average euro area increase in long-term government bond yields	0 basis point	205 basis points
Average add-on in credit spreads of corporate bonds	201 basis points	201 basis points
Shock to equity prices	-26%	-26%
Shock to property prices	-4.6%	-3.7%
Cumulative loss rates over two years	1.82%	1.60%

... with a number of simplifying assumptions

38 Only the financial instruments and investments accounted for as assets are considered in the exercise.

39 Slightly above 90% of the investments in corporate bonds are investment grade.

40 Financial assets owned by, and managed on the behalf of, policyholders with all appreciation and depreciation in these assets accruing to policyholders.

41 Typically, various iBoxx euro corporate bond indices with an average maturity of 5.5 years, a 4.5-5.1% average coupon rate and a 1.9-3.5% average yield as at 15 May 2012.

42 Meaning in addition to an increase in long-term interest rates.

43 The size of the latter was set by simulating a joint, multivariate forward distribution of daily compounded changes of various iTraxx indices with a 60-day horizon.

Exposures to market risk are significant

Losses mount under contagion and deleveraging scenario

assumed to fall by 26%. Property prices were assumed to decline by 3.7% to 4.6% on average in the euro area.⁴⁴

The results show that insurers remain considerably exposed to market risks. Moreover, the heterogeneity of the results for individual insurance groups suggests that some institutions are particularly vulnerable to the materialisation of risks if such a scenario were to occur. Under the demand risk scenario, which assumes a considerable weakening of economic activity in the euro area, the assets of insurers could be negatively impacted via stock and corporate bond market developments.

Under the contagion and deleveraging scenario, insurers' losses would be considerably larger and come mostly from investments in corporate debt and – to a somewhat lesser extent – sovereign debt. Estimates indicate that losses related to the investments in corporate debt could mount to 2.5% of the assets on average. A significant proportion of these losses stem from holdings of debt securities issued by other financial companies. The results also indicate that under the assumptions of an intensified euro area sovereign debt crisis and an associated unexpected increase in long-term interest rates, the average losses for insurers from sovereign holdings could be 1.0% of total assets.

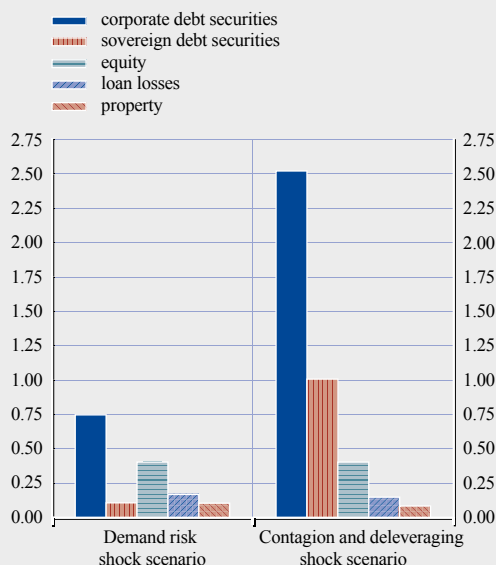
Regarding equity prices, losses of individual insurance companies under both scenarios are largely related to the size of investments, which is rather large in some cases. Finally, while conditions in several euro area property markets remain fragile, the potential losses for insurers would be limited due to the generally low share of property-related assets.

4.3 RISKS STEMMING FROM INTERLINKAGES OF FINANCIAL INSTITUTIONS REMAIN ELEVATED

Aspects of the intertwined relationships between financial intermediaries' balance sheets that can put pressure on banks to shed assets in a disorderly manner remain a challenge to the euro area financial system. Indications of substantial remaining risks in the operation of systemically important institutions are still evident, while developments in the perception of risks associated with counterparty activity has led to increasing regional concentration of risks in the last six months. Vulnerabilities evident at the time of the last FSR which were associated with the pernicious feedback effects between sovereign risk, banking system fragilities and economic growth remain a critical risk. The exacerbation of this risk in the second quarter of 2012 is creating disincentives which could hinder a lasting recovery of the euro area banking system, and could rapidly aggravate the balance that had been observed in the first three months of 2012.

Chart 4.36 Asset losses for large euro area insurers under different scenarios

(Q4 2011 – Q4 2013; percentage of total assets)



Sources: Bloomberg, individual institutions' financial reports, JPMorgan, Thomson Reuters Datastream and ECB calculations.
Note: Losses on equity holdings are the same under both depicted scenarios owing to the same size of the shock.

⁴⁴ Property prices react endogenously to other elements of the macro-financial scenario.

4.3.1 INTERLINKAGES STEMMING FROM BANKS' OPERATIONS

Risks stemming from the interlinkages arising from banks' operations abated considerably following the announcement of the Eurosystem's three-year LTROs. In particular, these measures provided needed relief following a period of a considerable build-up of risk, although the pressure intensified in April and May. Despite the slight recovery in money market activity in early 2012, funding from market sources remains subdued, especially at longer maturities or across national boundaries.

Intermediation-related transactions

While large payment flows across regions and/or national borders are a normal feature of any monetary union, the Trans-European Automated Real-time Gross settlement Express Transfer system (TARGET2) has received considerable attention over the last few months. This system, owned and operated by the Eurosystem, settles primarily interbank transactions and refinancing operations in central bank money. Flows across countries as part of this system reflect the underlying transactions typically being initiated by private sector participants, such as financial institutions, firms and households. The system also reflects euro area national central bank balances vis-à-vis the ECB from such cross-border interbank flows.

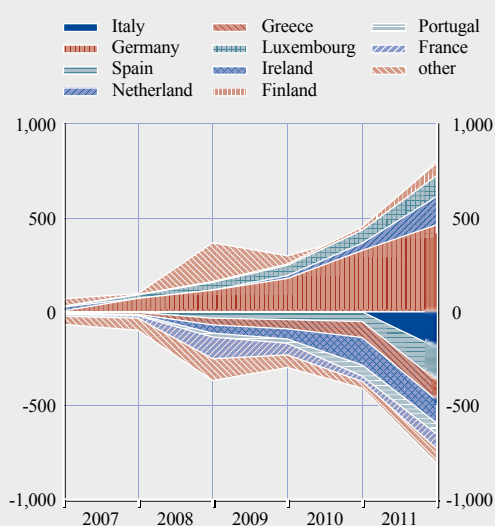
TARGET2 balances started to rise towards the end of 2007 when the interbank market came under strain and as these strains intensified, they reached an initial peak of about €370 billion at the end of 2008, reflecting the significant impairment of interbank markets (see Chart 4.37).⁴⁵ TARGET2 balances subsequently levelled off before rising again when the euro area sovereign debt crisis erupted. TARGET2 balances then increased from about €400 billion at the end of 2010 to more than €800 billion at the end of 2011.⁴⁶

TARGET2 balances can be modelled within a system of financial accounts (see Chart 4.38 for a simplified view of a system of accounts between two countries).⁴⁷ Within the simplified monetary union exemplified, each region has a household (which demands banknotes and supplies deposits), a corporate (which demands loans), a banking sector and a central bank. Owing to household banknote demand, banks can have a liquidity deficit which they cover by participating in central bank refinancing operations. Before the financial crisis (Panel A), shifts in household deposits from banks in hypothetical region 2 to banks in hypothetical region 1 led to a surplus of liquidity in region 1

TARGET2 balances point to growing retrenchment of private capital along national lines...

Chart 4.37 TARGET2 balances

(Dec. 2006 – Dec. 2011; EUR billions; end of year)



Source: ECB.

⁴⁵ See also the box entitled "TARGET2 balances of national central banks in the euro area", *Monthly Bulletin*, ECB, October 2011; the press release on "Bundesbank TARGET2 balances" issued by the Deutsche Bundesbank on 22 February 2011; and the box entitled "The dynamics of the Bundesbank's TARGET2 balances", *Monthly Report*, Deutsche Bundesbank, March 2011.

⁴⁶ See also the box on "TARGET2 balances in the Eurosystem in a context of impaired money markets", *Annual Report*, ECB, 2011.

⁴⁷ For a more elaborate discussion, see U. Bindseil and P.J. König, "The economics of TARGET2 balances", *SFB 649 Discussion Papers*, No 2011-35, Humboldt University Berlin, 2011.

Chart 4.38 TARGET2 balances in a system of financial accounts

A) Deposit transfer from Bank 2 to Bank 1, interbank market works

Bank 1		Bank 2	
Assets	Liabilities	Assets	Liabilities
Loans	Deposits	Loans	Deposits
<i>Interbank lending</i>			CB refinancing
	CB refinancing		<i>Interbank borrowing</i>

Central Bank 1		Central Bank 2	
Assets	Liabilities	Assets	Liabilities
CB refinancing	Banknotes	CB refinancing	Banknotes

B) Deposit transfer from Bank 2 to Bank 1, interbank market frozen

Bank 1		Bank 2	
Assets	Liabilities	Assets	Liabilities
Loans	Deposits	Loans	CB refinancing
Deposit facility			

Central Bank 1		Central Bank 2	
Assets	Liabilities	Assets	Liabilities
<i>Target claim</i>	Banknotes	CB refinancing	Banknotes
	Deposit facility		<i>Target liability</i>

Source: ECB.

... though consistent with a normal central banking function in a monetary union

The pricing of interbank transactions was supported by the three-year LTROs...

and a deficit in region 2, which banks in region 1 balanced by granting interbank loans to banks in region 2 – thereby implying no TARGET2 balances.

During the crisis period (Panel B), by contrast, TARGET2 balances started to emerge. In case of a deposit shift from banks in hypothetical region 2 to banks in hypothetical region 1, the crisis implied in several cases that banks in region 1 were no longer providing interbank loans to banks in region 2. Instead, region 2 banks covered their liquidity needs through increased recourse to central bank refinancing.⁴⁸ In the absence of central bank support, region 2 banks would have to liquidate their loan portfolios to meet their payment obligations. Though in this example TARGET2 balances reflect household deposit shifts, they can also arise from other transactions, such as exports and imports of goods and services, asset purchases from non-residents, or the repayment of debt to foreign creditors.

In both scenarios, transactions affected the financial account of a country's balance of payments. TARGET2 balances in panel B were a sign of the lack of interbank activity across euro area countries, albeit a symptom rather than the underlying cause.⁴⁹ TARGET2 balances

in themselves do not constitute an immediate financial stability risk, but they do embed information on country or regional disequilibria pertinent for euro area financial stability. During the financial crisis, the Eurosystem has provided liquidity support to solvent but illiquid credit institutions lacking access to the international interbank market, thereby playing a decisive role in preserving financial stability in the euro area.

Interbank linkages

The Eurosystem's three-year LTROs reduced strains in banks' operations with each another.⁵⁰ In particular, the short-term impact of the LTROs on bank and sovereign debt costs has been marked, as tensions previously evident in the pricing of interbank liquidity have rapidly eased (see Chart S.4.1). A regional decomposition of this aggregate development, however, suggests improvements in regions where stress had been evident. Transaction volumes, however, have

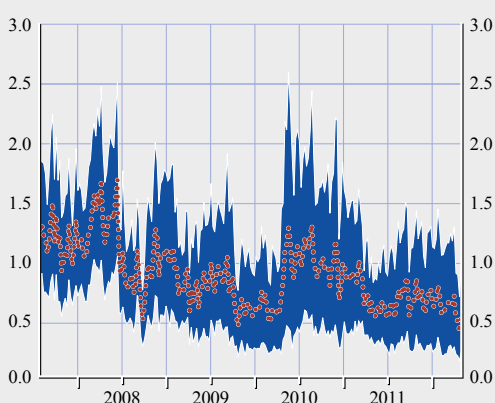
48 As the banks in region 2 demand more liquidity, the balance sheet of central bank 2 changes. For central bank balance sheets to continue balancing, an accounting position is needed that keeps track of intra-system liquidity movements. This is the role of TARGET2 claims and liabilities.

49 See also U. Bindseil, P. Cour-Thimann and P.J. König, "TARGET2 and cross-border interbank payments during the financial crisis", CESifo Forum Special Issue, January 2012.

50 The banks that borrowed liquidity through the three-year LTROs are generally not the same banks that deposited funds with the Eurosystem: only around 40% of the deposit facility usage derives from banks that bid at the three-year LTROs. The liquidity provided in the LTROs was therefore generally not immediately deposited with the Eurosystem.

Chart 4.39 Mean EONIA volume and dispersion across participants

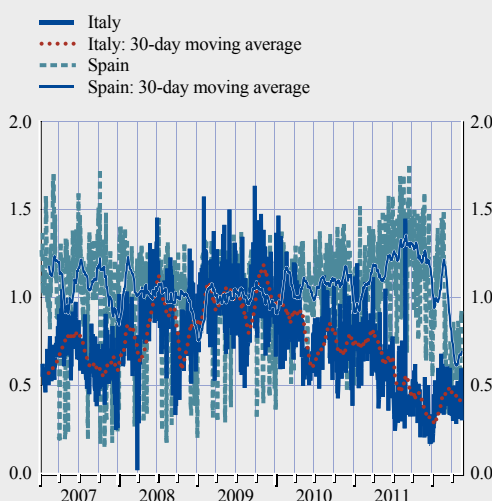
(Aug. 2007 – May 2012; weekly mean and non-parametric non-normal bootstrap confidence limits)



Source: ECB.

Chart 4.40 Volumes in Italian and Spanish repo markets

(Jan. 2007 – May 2012; volume weighted by period average)



Sources: MTS, Banco de España and ECB calculations.

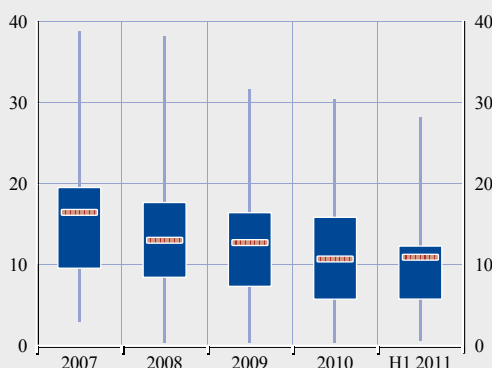
remained subdued in the EONIA overnight interbank market (see Chart 4.39). In the EONIA market, volumes stabilised at a turnover well below levels registered last summer, and substantially lower than the pre-crisis averages (see Section 3.1). In addition, the moderate pick-up in early 2012 in volumes in the Spanish and Italian repo markets from their low levels at the end of 2011 proved to be short-lived (see Chart 4.40), as tensions materialised again in Spain from early April.

The segmentation observed during the second half of 2011 in the interbank market related to the intensification of the sovereign debt crisis remains one of the major risks to proper interbank market functioning. This pattern has been evident in the structural decrease in interbank activity for the euro area banking sector as a whole (see Chart 4.41), also indicating that banks may have sought funding at shorter maturities elsewhere.

Sovereign and financial institution stresses have contributed to keeping counterparty risk heightened in two ways. First, interbank lending across borders has, to some extent, remained impaired. Second, the prevalence of secured versus unsecured funding (see Chart 4.42), including the continued significant use of

Chart 4.41 Ratio of interbank funding to total assets for the euro area banking sectors

(2007 – H1 2011; percentages, maximum, minimum, interquartile distribution and average)

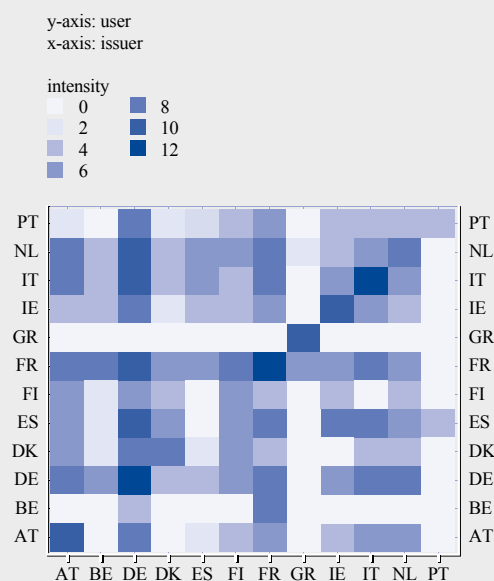


Source: ESCB consolidated banking data.
Note: For more information about the comparison between the consolidated banking data and other macro-prudential datasets, see ECB, *MFI balance sheet and interest rate statistics and EBA guidelines on FINREP and COREP/Large Exposures*, March 2012.

*... but limited
recovery in
interbank activity at
the euro area and
national levels*

Chart 4.42 Cross-holdings of securities of euro area banks

(9 May 2012; log of EUR billions)



Sources: ECB.

Notes: The intensity of the cell reflects the level of securities issued by banks in the country listed on the x-axis used as collateral with the Eurosystem by banks resident in the country listed on the y-axis.

Chart 4.43 Probability of a simultaneous default of two or more euro area large and complex banking groups

(Jan. 2007 – May 2012; probability in percentages)

- 1 Turmoil begins
- 2 Bear Stearns rescue takeover
- 3 Lehman Brothers defaults
- 4 Greek fiscal problems gain media attention
- 5 Programme for Ireland signed
- 6 Portuguese government asks for financial assistance
- 7 EU summit 21 July



Sources: Bloomberg and ECB calculations.

Note: For further details of the indicator, see Box 8.

government-guaranteed bonds and covered bonds (see Section 4.1), reinforces the view that counterparty concerns remain high.

*... and further
delineation of
interbank activity
across national lines
was evident*

Bank relationships evident in the cross-holdings of securities have also been negatively affected by the ongoing sovereign stress, as an apparent general aversion to holding securities issued by banks in affected economies has continued. In this context, of the €307 billion of bank-issued collateral pledged to the ECB by non-resident banks in February 2010, only about €209 billion continued to be pledged by non-resident banks in March 2012. Overall, there was continued evidence of a preference by banks to hold securities issued by banks in their own jurisdiction (see Chart 4.42), with a set of core banks playing a central role in obtaining funding through the sale of debt securities to other banks (see Special Feature C). The magnitude of the exposures underlines a key note for these core banks. The reach of such a potential shock is increasingly within national borders.

A decrease in the immediate interdependence of risk across euro area banks is evident in the substantial decrease in estimates of the conditional joint probability of the failure of two or more banks (see Chart 4.43 and Box 8), which in late November 2011 reached unprecedented levels. The timing of the sharp improvement in this measure closely matches the announcement and implementation of the three-year LTROs, although a renewed substantial deterioration was evident in May.

Box 8

**SYSTEMIC RISK MEASURE – A PORTFOLIO PROBABILISTIC PERSPECTIVE ON MEASURING
DEFAULT RISK**

The risk of banking institutions defaulting – and in particular those with a systemic dimension – is at the heart of financial stability analysis. One approach to modelling such default risk which has gained considerable prominence in recent years concerns the probability of simultaneous failures of multiple financial institutions. While such extreme events are highly unlikely to actually materialise in practice, such methodologies provide a succinct means of conceptually viewing the financial system as a joint distribution of its constituent financial institutions. Moreover, such a methodology can take publicly available data to assess the likelihood of such an extreme systemic event. This box presents a methodology based on clear, flexible and reproducible estimation methods to measure such joint default risk, applied to euro area large and complex banking groups (LCBGs) – and compares it with results from selected existing methodologies.

The measure is derived on the basis of a three-step procedure.¹ First, credit default swap (CDS) contracts of different maturities are used to extract the perceived individual default risk of euro area LCBGs. To recover individual probabilities of default from CDS spreads, a standard cumulative probability model that incorporates recovery rates, refinancing rates and continuous compounding is employed.² The second step involves recovering the joint probability density of the banks concerned defaulting. Since joint credit events are rarely traded in the default insurance market, assumptions are needed to generate a synthetic structure to measure the joint default probability density within the system, thus allowing a mapping from marginal to joint probabilities of default. There are numerous procedures readily available in the literature, one which is particularly suitable being the Consistent Information Multivariate Density Optimization (CIMDO) Procedure.³ This methodology relies on the market beliefs of an institution's performance, rather than a direct investigation of its capital structure. On the basis of the banking system's multivariate probability density so far obtained, a third and final step involves deriving an indicator for the perceived joint probability of at least two LCBGs defaulting.

The resulting systemic risk measure (SRM) is closely related to the systemic risk indicator (SRI) first presented in the December 2007 FSR (see Chart A). While both aim to capture the interdependence of default risk of a set of euro area LCBGs, their evolution has been somewhat divergent in recent years. Most importantly, the estimated rise in perceived systemic fragility during the sub-prime crisis from mid-2007 to mid-2009 is less accentuated in the SRM compared with the SRI. The subsequent dynamics are similar across both indicators to a large extent: after a period of decline and stabilisation in 2009, the indicators rose again from April 2010 onwards, reaching peaks in late November and early December 2011, then declining in early 2012 and rising again in April and May 2012.

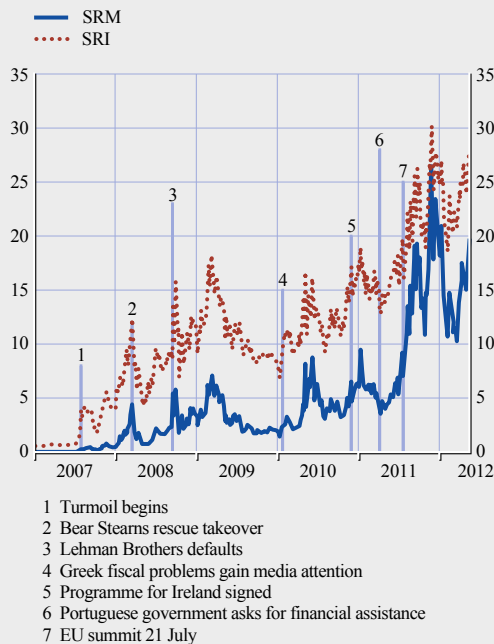
1 The methodology presented in this box is based on the procedure outlined in D. Radev, "Assessing Systemic Fragility – A Probabilistic Perspective", Working Paper, GSEFM Frankfurt-Mainz-Darmstadt and Johannes Gutenberg University Mainz, 2012.

2 This model is known as CDS bootstrapping. For further details, see e.g. D. O'Kane and S. Turnbull, "Valuation of Credit Default Swaps", Fixed Income Quantitative Credit Research, Lehman Brothers, April 2003, and M. Adelson, M. van Bemmelen and M. Whetten, "Credit Default Swap (CDS) Primer", Nomura Fixed Income Research, May 2004, and further references therein. It conservatively implies risk-neutral probabilities that are higher than actual probabilities.

3 See M. Segoviano, "The Consistent Information Multivariate Density Optimizing Methodology", Financial Markets Group, Discussion Paper 557, London School of Economics, 2006.

Chart A Probability of a simultaneous default by two or more large and complex banking groups as measured by previous (SRI) and new (SRM) methodologies

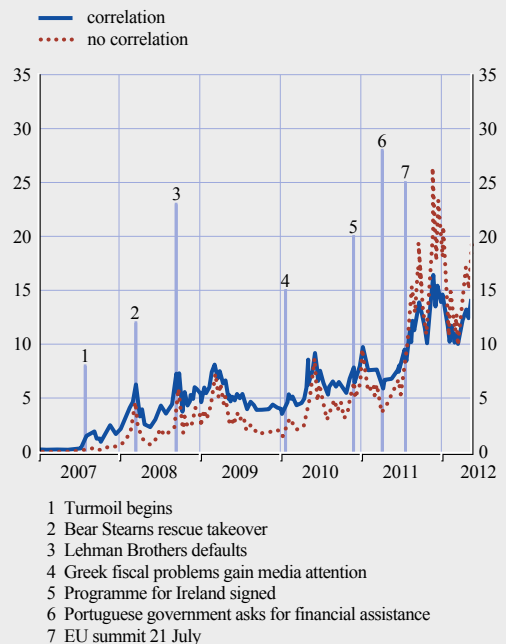
(Jan. 2007 – May 2012; probability; percentages)



Sources: Bloomberg and ECB calculations.
Note: The SRM has a sample of 15 banks, compared with a sample of 11 banks used in the SRI, and uses a one-year horizon instead of two.

Chart B Probability of a simultaneous default of two or more large and complex banking groups, with and without multivariate model correlation (SRM)

(Jan. 2007 – May 2012; probability; percentages)



Sources: Bloomberg and ECB calculations.
Note: Model correlation is estimated by the overall sample correlation of the marginal probability measures.

In addition, the inclusion of model-specific correlation (see Chart B) in the multivariate probability distribution itself alters the notion of risk of joint default. Prior to mid-2011, in a period that could be characterised as having been driven by global factors, the model with correlation (in the probability function itself) depicts higher levels of fragility. By contrast, since 2011 the model without correlation shows a higher level of fragility. This illustrates the impact of such “structural” forms of model correlation.

All in all, the new measure updates the methodological underpinnings of a multivariate perspective of default risk modelling for euro area banks. While not free of caveats – notably the model’s dependence on estimates – this measure provides a robust, flexible, succinct and widespread means of illustrating systemic stress within the banking sector.

4.3.2 INTERLINKAGES STEMMING FROM CROSS-SECTORAL INTERACTION

Risks related to interdependencies in banks’ lending and funding activities with other financial institutions (such as insurance companies and other financial intermediaries) appear to have eased up to March 2012, as funding conditions for banks improved (see Section 4.1).

Interlinkages of bank activities with other financial intermediation sectors

Euro area insurance companies have substantially adjusted the composition of their holdings of financial assets issued by other sectors (see Chart 4.44). While holdings of securities issued by the government and MFI sectors remain significant and form the bulk of financial assets held by this

Other financial institutions appear to have scaled back on their funding of banks...

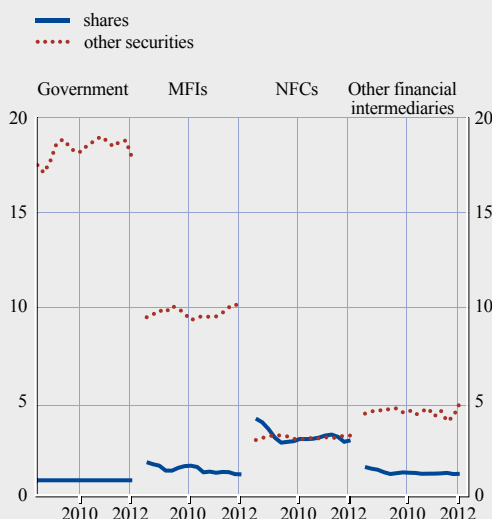
sector, a clear reduction was observed in the last quarter of 2011 – especially in government bond holdings. By contrast, the holdings of assets of other financial intermediaries increased to a historical high, suggesting an evolving intermediation role played by insurers.

Indicators point to an increase in the activity of institutions in the “shadow banking” sector, whose function is primarily securitisation, money market activities, repo transactions and hedged operations (hedge funds), while the recovery observed in the provision of funding by US prime money market funds (MMFs) portrays a recovery in money market fund activity. US MMFs were, in the past, an important provider of liquidity for euro area banks (euro area banks represented slightly more than 13% of the sector’s USD 1.42 trillion of assets in April 2012). Total holdings by US MMFs of euro area paper in April 2012 increased by 21% relative to January. However, this improvement came on the back of a decreasing trend up to December 2011, and holdings remained 63% below the level recorded in May 2011. Some of this fall may be permanent in the sense that it reflects euro area banks’ reduced need for USD funding following a decline in their USD assets and lending, as well as a concerted recent effort to reduce dependence on US MMFs given their volatility as a funding source. Furthermore, an increasing trend in the use of repo transactions involving European financial institutions is evident in an environment of continuing risk aversion (for example, nearly 33% of all US MMF transactions in April compared with less than 10% just a few years before).⁵¹ The growth in repos versus unsecured transactions (see Section 3.1) underpins the growing participation of shadow banking institutions in market transactions, as secured transactions involve financial institutions as well as those institutions ultimately related to the repo. This greater participation of typically global financial institutions (see Section 3.2) in the financing and conduct of financial transactions indicates the growing complexity and interconnectedness of core transactions in the financial system.

The use of credit protection in the form of credit default swaps (CDSs) has continued to decrease since the publication of the December 2011 FSR. This development is evident in the fall of outstanding CDS contracts on both sovereigns perceived to be under stress and financials over recent months. Data from the Depository Trust & Clearing Corporation indicate that net nominal positions of sellers of CDS protection against sovereign risk stood, in mid-May 2012, at around USD 3.5 billion for Irish debt (down from USD 4.2 billion in October 2011), USD 4.8 billion for Portuguese debt (down from USD 9 billion), USD 14.9 billion for Spanish debt (down from USD 18.6 billion) and USD 20.4 billion for Italian debt (down from USD 25 billion). At the same

Chart 4.44 Financial assets of euro area insurance companies and pension funds

(Q1 2008 – Q4 2011; percentage of total financial assets)



Source: ECB.

Note: MFIs denotes monetary financial institutions and NFCs denotes non-financial corporations.

... and resulted in the growing importance of shadow banking institutions in some activities

⁵¹ See Fitch Ratings, “U.S. Money Fund Exposure and European Banks: Holding Pattern”, May 2012.

time, net notional contracts worth USD 13.3 billion were outstanding on iTraxx Europe senior financials, down from USD 15.5 billion in October 2011.⁵²

Exposures among banks and other institutional sectors

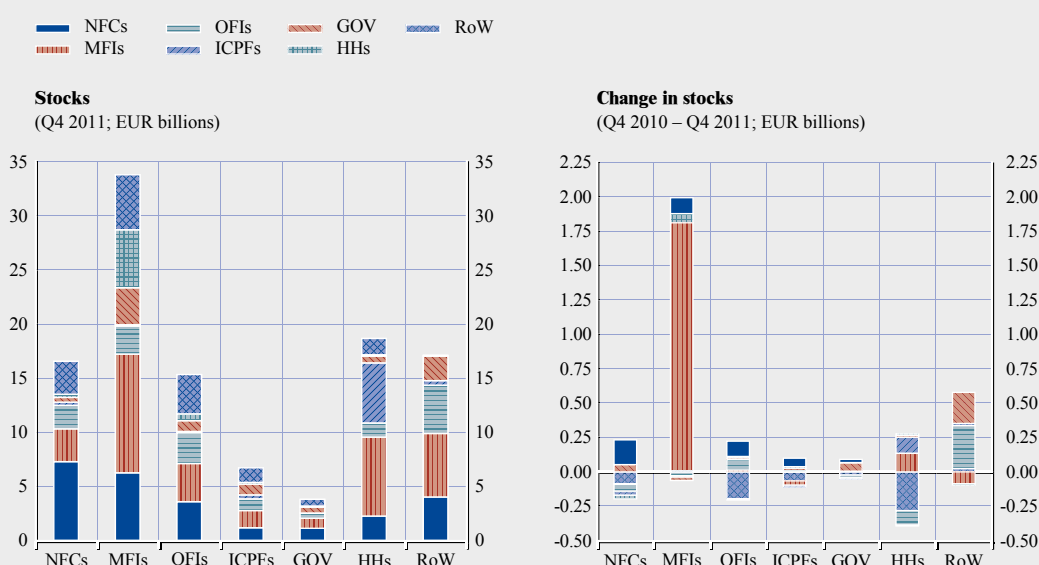
The banking system remains at the core of a network which reallocates funds from savers to investors and, in doing so, increases the efficiency of financial markets. However, the flow of funds between the financial system and other sectors of the economy, such as households or non-financial corporations, varied in 2011 (see Chart 4.45).

More comprehensive data on the flow of funds between sectors, however, suggest that intra-sectoral holdings of the MFI sector increased substantially during 2011, after a continuous reduction since the onset of the financial crisis. This was largely due to the funding provided by the Eurosystem to banks. Regarding inter-sectoral linkages in general, the exposure of the euro area MFI sector to the rest of the world and households grew during 2011, while exposure to other domestic sectors decreased. At the same time, all sectors in the euro area except the MFI sector became slightly more exposed to liabilities issued by governments in the euro area – attributable to a large extent to borrowing by sovereigns.

Valuation effects have also played a role in altering the network of holdings among sectors. In 2011 the redistribution of the intra- and inter-sectoral holdings in the euro area was significantly affected by the

52 Owing to the credit event in Greece, no outstanding positions are evident on Hellenic Republic debt. The Itraxx Europe senior financials index (most current series) is composed of the largest financial debt issuers in Europe.

Chart 4.45 Stocks and change in sectoral financial assets in the euro area

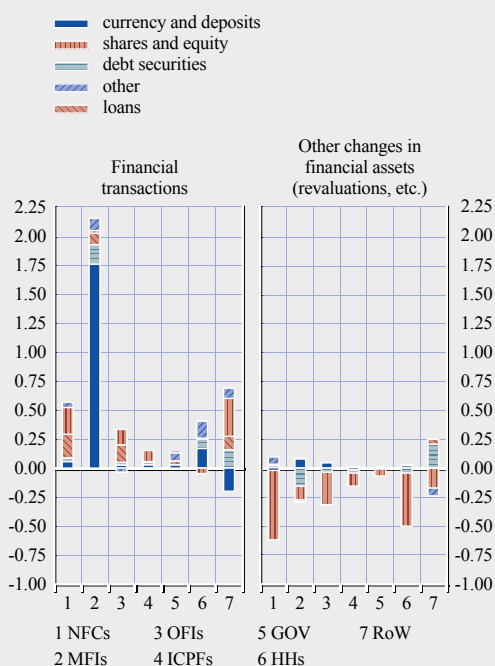


Source: ECB.

Notes: The inter-sectoral financial assets by instrument were estimated on the basis of flow-of-fund statistics. Owing to the double-entry accounting principle applied in these statistics, the depicted financial assets of a sector x vis-à-vis a sector y can also be viewed as liabilities of sector y to sector x. NFCs denotes non-financial corporations, MFIs denotes monetary financial institutions, OFIs denotes other financial intermediaries, ICPFs denotes insurance corporations and pension funds, GOV denotes general government, HHs denotes households and RoW denotes rest of the world.

Chart 4.46 Contributions of different financial instruments to changes in sectoral financial assets in the euro area

(Q4 2010 – Q4 2011; EUR billions)

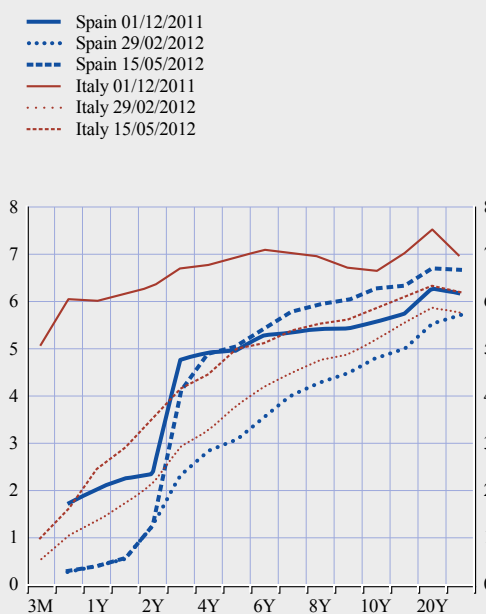


Source: ECB.

Note: NFCs denotes non-financial corporations, MFIs denotes monetary financial institutions, OFIs denotes other financial intermediaries, ICPFs denotes insurance corporations and pension funds, GOV denotes general government, HHs denotes households and RoW denotes rest of the world.

Chart 4.47 Changes in Spain and Italy's sovereign term structure following the announcement of the three-year longer-term refinancing operation

(Dec. 2011 – May 2012)



Source: Bloomberg.

fall in financial asset prices. This was particularly true for equity prices,⁵³ which had a negative impact on the value of financial assets held by all euro area institutional sectors, as well as the rest of the world (see Chart 4.46). In addition to this, the valuation of debt securities also played a role, though a reduced one. The MFI sector took the largest hit from a fall in aggregate valuation of debt securities, whereas the rest of the world experienced a positive valuation effect related to the composition of investment portfolios by geographical jurisdiction.

Banking activity has remained substantially affected by the cycle of tensions stemming from ongoing sovereign strains (see Section 2.4). The historical highs reached towards the end of 2011 in the government bond yields of several euro area countries and in CDS spreads also had an acute impact on bank funding costs, given the close interdependence between sovereigns and their domestic banks. As a consequence of the easing of sovereign stress in conjunction with the three-year LTROs, banks' ability to obtain funding in markets improved. In some cases, however, the relationship between sovereigns and banks may have become more intertwined. A significant decline in government funding costs in the first quarter of 2012, in particular of debt with a maturity of less than three years (see Chart 4.47), partially reversed by May 2012. In the first three months of 2012 euro area MFIs (excluding central banks) increased their holdings of sovereign bonds by

... with
interlinkages
between banks and
their sovereign
becoming stronger
in some countries

53 Investment in shares and other equity is the major form of sectoral holdings for non-financial corporations, other financial intermediaries, insurance corporations and pension funds, general government and the rest of the world.

€125 billion, almost exclusively accounted for by Spanish and Italian MFIs after the announcement of the two three-year LTROs conducted by the Eurosystem. The ensuing stocks of government bonds held by Spanish MFIs edged up to €263 billion, and by Italian MFIs to €324 billion. As a result, the share of Spanish and Italian MFIs' domestic sovereign bond holdings as a percentage of total assets stood at 6.7% and 7.6%, respectively, in March 2012. The sharp increase in the interdependence of the banking and sovereign sectors in these countries points to the increased vulnerability of their banks to further adverse sovereign developments affecting these countries.



IV SPECIAL FEATURES

A EU BANK DELEVERAGING – DRIVING FORCES AND STRATEGIES

Deleveraging by EU banks over the medium term is to be expected owing to funding and capital-related pressures of both a cyclical and especially a structural nature. Major EU banks have already reduced their leverage ratios since the outbreak of the financial crisis, mainly via improving nominal capital levels. Going forward, the deleveraging process is, however, likely to focus primarily on the asset side, given the current difficult conditions in capital markets and the subdued growth outlook. The externalities associated with this process need not necessarily be negative. Deleveraging can reflect a more efficient allocation of financial resources, a correction of over-inflated asset prices or a reduction of debt overhangs, all of which would bring the economy onto a more sustainable growth path. This notwithstanding, authorities need to monitor the process closely to ensure that it occurs in an orderly fashion and thus avoid negative repercussions on the real economy and the financial system more broadly.

INTRODUCTION

Credit cycles are a common feature of financial systems and tend to positively correlate with the business cycle, reflecting fluctuations in borrowers' demand for, and need of, financing. Cycles in credit developments, and thereby implicitly in financial sector leverage (typically measured by asset-to-equity ratios), are typically exacerbated by the inherent pro-cyclical behaviour of financial intermediaries and market participants.¹ Deleveraging is not all bad. To the extent that it reflects a correction of previously inflated asset prices and debt overhangs, it is a necessary process to bring the economy back to a more sustainable equilibrium. In cases where high leverage reflects a misallocation of financial resources, the deleveraging process may result in their more efficient allocation. It may thereby create scope for new lending to finance more profitable business opportunities supporting the recovery of economic activity. However, deleveraging processes can be long and painful, especially in cases where they occur simultaneously with shocks to the financial sector (as, for instance, in Japan in the 1990s and early 2000s²). Against this background, this special feature looks in more detail at the deleveraging forces currently affecting the EU banking sector, the deleveraging strategies that banks are likely to adopt and the international dimension of the process.

EU BANK DELEVERAGING FORCES

Concerns have recently been raised about the magnitude and potential consequences of EU bank deleveraging. There are several reasons behind EU banks' drive to deleverage their balance sheets. First, a debt overhang had been built up in some EU countries during the pre-crisis period that is currently being corrected. In addition, the financial crisis exposed a number of unsustainable features of some EU banks' business models – such as a heavy reliance on short-term wholesale funding, overly complex group structures and insufficient capital buffers – which banks need to adjust to ensure long-term viability. Finally, the EU banking sector has been hit by a number of

Deleveraging tends to follow the credit and business cycles...

... it can have serious real economic repercussions, but may also represent a sound correction of past imbalances

EU bank deleveraging needs are driven by a diverse range of factors

- 1 For some recent studies, see N. Kiyotaki and J. Moore, "Credit cycles", *Journal of Political Economy*, Vol. 105(2), 1997; F. Allen and D. Gale, "Financial intermediaries and markets", *Econometrica*, Vol. 72, 2004; T. Adrian and H.S. Shin, "Liquidity and leverage", *Journal of Financial Intermediation*, Vol. 19, 2010; M. Brunnermeier and L. Pedersen, "Market liquidity and funding liquidity", *Review of Financial Studies*, Vol. 22, No 6, 2009; A. Fostel and J. Geanakoplos, "Leverage cycles and the anxious economy", *American Economic Review*, Vol. 98, No 4, 2008.
- 2 See T. Sekine, K. Kobayashi and Y. Saita, "Forbearance Lending: The Case of Japanese Firms" *Monetary and Economic Studies*, Bank of Japan, Vol. 21(2), August 2003; R.J. Caballero, T. Hoshi and A.K. Kashyap, "Zombie Lending and Depressed Restructuring in Japan", *American Economic Review*, Vol. 98, No 5, 2008.

recent shocks, notably the US sub-prime crisis and the euro area sovereign debt crisis. This has created uncertainty about the EU banking sector's resilience.

A number of studies have shown that highly leveraged financial institutions and those with a relatively high dependence on wholesale funding were more fragile and experienced more significant declines in share prices during the financial crisis.³ Accordingly, highly leveraged banks have faced pressure to raise their nominal capital levels and improve their leverage ratios from both regulators and supervisors (such as the Basel III framework and the framework for global systemically important banks or "G-SIBs" and the European Banking Authority's EU-wide stress tests and recent recapitalisation exercise) and from market participants (as reflected, for instance, in the current low price-to-book values of listed EU banks). In addition, the rising credit risk in view of the general economic downturn and the recent shocks to EU banks have led to severe funding and capital-related pressures on bank balance sheets, forcing many EU banks to deleverage.

Deleveraging can occur both via adjustments to banks' capital and liabilities and via asset reductions

To counter the funding and capital-related pressures, banks may be expected to reduce assets in order to improve their capital or liquidity positions, or both. The recourse to asset reductions may be lessened by raising capital (via equity issuance, conversion of hybrid debt, or retained earnings) and increasing the use of stable funding sources (e.g. retail deposits and long-term wholesale funding). These measures are, however, typically comparatively costly and/or difficult to implement within a short time span, especially in periods of distress.⁴ Furthermore, raising new equity may dilute the value of the shares of existing shareholders and may signal that managers believe that the stock is overvalued, thus leading to negative stock price reactions.⁵ Under such circumstances, the only viable option for banks to alleviate pressures on their balance sheets might be to reduce assets. This can be achieved by selling off (non-core) business lines, shedding liquid assets (e.g. securities holdings) and scaling down the loan portfolio (e.g. non-renewal of maturing loans and restricting new lending).

Banks' deleveraging efforts are likely to reflect specific pressures

Deleveraging actions and mitigating measures can materialise in different combinations, depending on the specific bank balance sheet pressures that they are meant to address (see Chart A.1). For example, if funding-related pressures are the main concern, banks could be expected to primarily try to shed more liquid and non-core assets that can be sold off within a short time frame or assets specifically linked to funding sources that are no longer available. By contrast, should deleveraging pressures mainly relate to banks' capital positions, the banks have an incentive to shed more capital-intensive assets that provide the largest reduction in risk-weighted assets.

Small capital shortfalls can give rise to large deleveraging needs

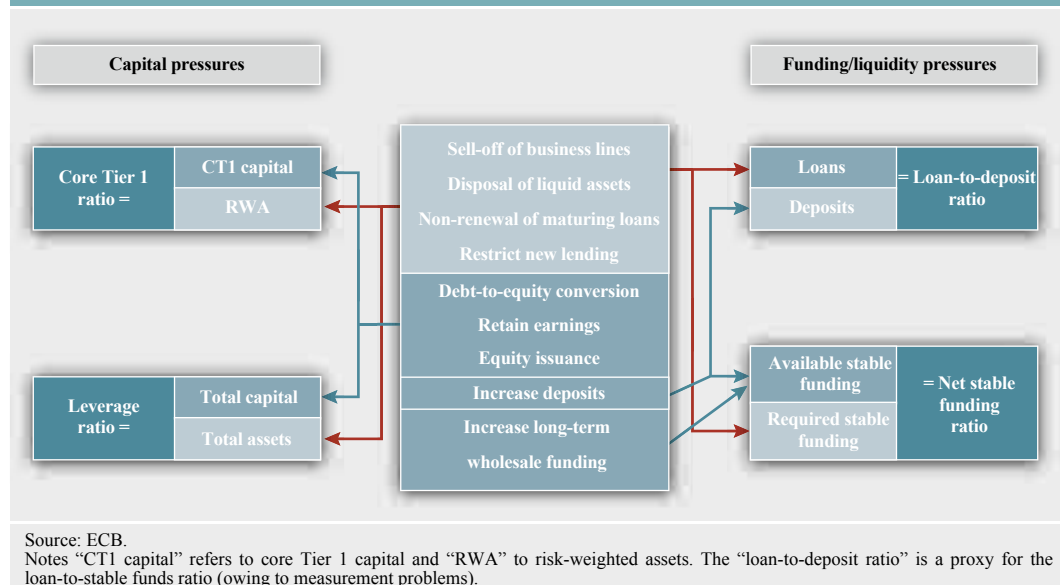
Moreover, owing to a multiplier effect, even a small capital shortfall can result in large deleveraging needs if other mitigating actions, such as raising new equity, are not taken. For example, a capital shortfall of €100 billion could, depending on the extent to which it is covered through changes in liabilities or via asset reductions, require as much as a €1,250 billion reduction of risk-weighted assets and even more in terms of total assets. Deleveraging on account of funding shortfalls is not subject to a multiplier effect, but funding gaps can be more acute and need to be resolved within a short time span to avoid illiquidity turning into insolvency.

3 C. Raddatz, "When the Rivers Run Dry: Liquidity and the Use of Wholesale Funds in the Transmission of the U.S. Subprime Crisis", *World Bank Policy Research Working Paper Series*, No 5203, 2010; and A. Beltratti and R.M. Stulz, "The credit crisis around the globe: Why did some banks perform better?", *Fisher College of Business Working Paper*, No 2010-03-005, 2011.

4 See P. Bolton, and X. Freixas, "Corporate finance and the monetary transmission mechanism", *The Review of Financial Studies*, Vol. 19, 2006.

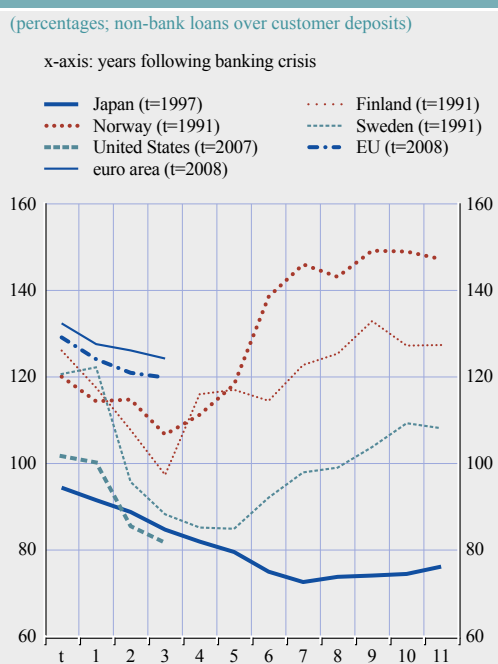
5 See S.C. Myers, and N.S. Majluf, "Corporate financing and investment decisions when firms have information that investors do not have", *Journal of Financial Economics*, Vol. 13, Issue 2, 1984.

Chart A.1 Deleveraging pressures and means to accommodate them



Historical experience shows that leverage (the assets-to-equity ratio) and loan-to-stable funds ratios (proxied by loan-to-deposit ratios, owing to measurement problems) tend to decline significantly when a crisis hits the banking sector. In fact, the loan-to-deposit and leverage ratios of large banks in Europe may have much further to fall as they are well above the levels observed in the aftermath of previous banking crises. Loan-to-deposit ratios in the Finnish and Swedish banking sectors were over 120% at the onset of their respective crises at the beginning of the 1990s and fell by around 30 percentage points within three years (see Chart A.2). The Japanese and Norwegian banking sectors experienced declines of around 20 percentage points; the former from a relatively low level and over a period of seven years and the latter from a relatively high level and within three years. By comparison, the loan-to-deposit ratio of the euro area banking sector has only declined by 6 percentage points since the beginning of the financial crisis and is 44 percentage points higher than the current level for US banks. From a historical perspective, a further downward readjustment of the amount of loans to be funded by non-deposit sources may therefore be expected.

Chart A.2 Evolution of banks' loan-to-deposit ratios following banking crises



Sources: OECD, Federal Reserve System, financial reports and ECB calculations.

Notes: Banking crises dates are based on L. Laeven and F. Valencia, "Resolution of Banking Crises: The Good, the Bad, and the Ugly", *IMF Working Paper*, No 10/146, 2010. Data for euro area and the EU refer to large banking groups.

Deleveraging often occurs as a response to a financial crisis

From a historical perspective, EU bank deleveraging may still have some way to go

Since the outbreak of the financial crisis, EU banks have mainly increased capital, though this may be more difficult going forward

Prevailing high bank funding costs may lead to disintermediation

In terms of leverage ratios, both the Japanese and the Norwegian banking sectors had substantial leverage ratios at the onset of their respective crises. These ratios fell dramatically within two years, from 36 to 20 for Japan and from 34 to 17 for Norway. One important difference between the two cases is that in Japan the main adjustment occurred via asset reductions, whereas in the case of Norway it occurred primarily via an increase in capital and reserves. The leverage ratios of the large EU banks have declined more moderately, from 30 at the outbreak of the financial crisis to 21 by 2011 (see Chart A.3). Notably, the leverage ratios of large euro area banks remain relatively high at 25.

Most of the improvement to date has been achieved via the capital side, either through equity issuance, a conversion of hybrids, capital injections or retained earnings. Overall, between 2008 and early 2012, bank equity increased by almost €400 billion. Some reduction in leverage was achieved via sales and write-downs on the asset side. The ability of EU banks to tap the capital markets has been hampered significantly by the euro area sovereign debt crisis.⁶ If the sovereign debt crisis persists and the outlook for earnings remains weak, it will be difficult for banks to reduce their leverage ratios significantly further without targeting assets to a greater extent.⁷

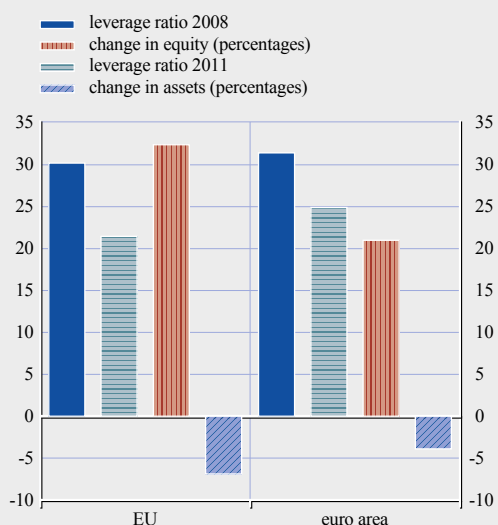
Another key source of deleveraging is the elevated funding costs, particularly on unsecured funding, which may imply that certain banking activities become unprofitable. In fact, the unsecured funding costs of euro area banks and banks' lending rates to non-financial corporations are currently higher than the non-financial corporate bond yields (see Chart A.4). If this situation were to persist for a

⁶ Equity issuance in 2010 and 2011 was only one-third of the level recorded in 2008 and 2009.

⁷ The participation of public funds is predicted in cases where solvent banks are unable to find private solutions to meet the increase in capital requirements.

Chart A.3 Leverage ratios of large EU banks

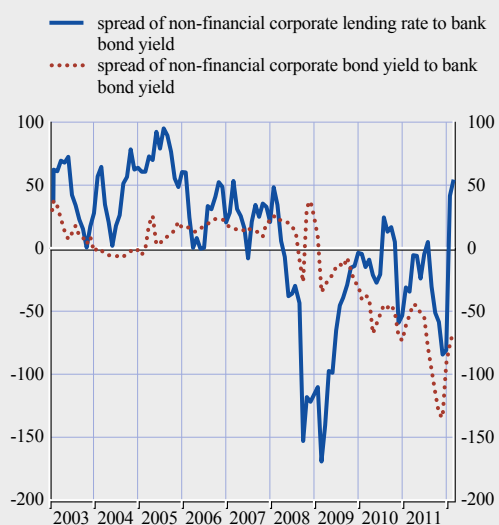
(assets-to-equity)



Sources: Financial reports and ECB calculations.

Chart A.4 Spreads of non-financial corporate bank lending rates and non-financial corporate bond yields vis-à-vis bank bond yields in the euro area

(Jan. 2003 – Mar. 2012; basis points)



Sources: Bloomberg, Thomson Reuters, ECB and ECB calculations.

prolonged period of time, it could fuel a disintermediation process whereby corporate bank financing would be partly replaced by corporate bonds, in particular in the case of large firms.⁸

THE SCOPE AND STRATEGIES OF EU BANK DELEVERAGING

In view of these developments and in order to gauge the financial and real economic implications of the deleveraging process, the scope and magnitude of banks' efforts will need to be assessed and monitored.

A number of large EU banks have announced significant medium-term restructuring plans aimed at improving capital ratios and decreasing reliance on wholesale funding. These plans include asset reductions of approximately €1.6 trillion (around €1 trillion for euro area banks) over the next three to four years (see the table below). Although some banks have already made considerable progress in achieving their targets, the potential additional impact on total EU banking assets remains sizeable over the medium term. It should be noted that a bank's plans are considered in isolation; therefore, the impact at the aggregate level will be reduced if the assets are purchased by other EU/euro area banks.

Although the acute funding pressures that were a key driver of recent deleveraging plans have been substantially eased by the Eurosystem's three-year longer-term refinancing operations (LTROs), market intelligence and bank announcements indicate that banks will proceed with their plans. The aim of most banks' plans is to reduce their market funding in response to the difficult environment that they continue to face. Capital requirements are also noted in many banks' plans, with certain banks targeting a reduction of risk-weighted assets in response to the Basel 2.5 and Basel III regulatory standards. Following the EBA's recapitalisation exercise, those banks that were identified as having a shortfall announced plans to build up their capital buffers, most of which had been successfully implemented by the end of 2011, without much recourse to asset reductions.

The magnitude of the deleveraging plans put forward by institutions varies greatly. The most substantial plans were announced by banks that faced severe funding problems, in particular those that had to be rescued by public authorities. In certain instances, these institutions have been required under EU law to sell assets in order to minimise competitive distortions. Banks' plans tend to focus on corporate and investment banking assets and, to a lesser extent, on retail banking.

A number of banks, especially French banks, are targeting dollar-denominated investment banking assets in response to the difficulties in accessing US dollar funding. In addition, investment banking activities have become less profitable and require more capital and liquidity buffers under Basel 2.5 and Basel III. Where retail banking is concerned, asset reductions tend to be minor, except in the case of a few institutions that have sold retail subsidiaries in the United States and in central and eastern

Banks have announced sizeable restructuring plans...

... aiming to alleviate funding and capital-related pressures

Plans focus mainly on corporate and investment banking assets and less so on retail banking

Medium-term deleveraging plans announced by EU banks

(EUR millions)

	Estimated impact of plans on total assets
Non-programme countries	946,900
Programme countries	34,300
Euro area	981,200
United Kingdom	662,316
EU	1,643,516

Sources: Investor reports and presentations by the various financial institutions.

Notes: Programme countries refer to countries that are the subject of an EU/International Monetary Fund adjustment programme. Banks' plans typically cover the period to the end of 2014, some to 2015. Where banks have announced a decline in risk-weighted assets, the impact on total assets is derived by assuming the risk-weighted asset/total asset ratio will remain stable.

Difficulties in obtaining US dollar funding has resulted in the need to shed US dollar-denominated assets

⁸ There is some evidence that this disintermediation process is already taking place, as indicated, for example, by the significant – also from a historical perspective – corporate bond issuance by EU non-financial corporations observed in recent months.

Banks' capital constraints, cyclical and structural funding pressures and restructuring plans would imply that EU banks have non-negligible deleveraging needs...

Europe. Other banks' plans include some downsizing of mortgage businesses, a reduction in leasing activities and an improvement in loan-to-deposit ratios.

A QUANTIFICATION OF EU BANK DELEVERAGING NEEDS

A broad assessment of the deleveraging needs of EU banks until the end of 2013 should take into account the range of possible sources of deleveraging presented in Chart A.1.⁹

Capital constraints: banks facing a capital shortfall at the end of 2013 under a macroeconomic scenario contingent on the European Commission's Spring 2012 Forecast that affects the amount of their loan losses and their net operating income, and assuming the core Tier 1 capital ratio threshold of 9%,¹⁰ may decide to reduce their risk-weighted assets, instead of raising fresh capital in the markets, to close the gap. The estimated capital shortfall is mitigated by the capital accumulated in the context of the EBA's 2011 EU Capital Exercise (to be completed by the end of June 2012) and by the potential beneficial impact on banks' earnings of the two three-year LTROs conducted by the Eurosystem in December 2011 and February 2012.

Wholesale funding constraints: banks may not be able to roll over all their maturing wholesale funding over the two-year horizon.¹¹ It has been assumed that banks will roll over only 90% of their wholesale debt maturing in 2012 and 2013. The funding constraints will, however, be mitigated by the substantial net take-up of the two three-year LTROs.

Structural funding constraints: in addition, some deleveraging needs may arise on account of structural funding pressures that reflect banks' incentives to reduce their reliance on short-term, volatile funding sources.¹² Against this background, country-specific targets for banks' loan-to-deposit ratios were imposed. Those targets are largely based on the assumptions of the EU/International Monetary Fund (IMF) adjustment programmes. For less vulnerable non-programme countries, the targets were assumed to be less severe.¹³

Information on **banks' own restructuring plans** was incorporated in the assessment to the extent that the estimated deleveraging needs were assumed to be at least as large as those announced in the restructuring plans.¹⁴

9 The sample includes 70 large and medium-sized EU banks, corresponding to the sample of banks used in the EBA's 2011 EU Capital Exercise. The data are at the consolidated banking group level.

10 This is a more stringent requirement than the prevailing minimum capital requirements, but may reflect the buffer in excess of the regulatory minimum that EU banks are currently targeting, on average. It is also in line with the threshold set in the EBA's 2011 EU Capital Exercise.

11 This may be caused either by quantitative restrictions on the total amount of available wholesale funding or by unfavourable pricing.

12 Structural funding constraints have also been put forward by the regulatory community; for example, those reflected in the planned introduction of the net stable funding ratio under the Basel III framework.

13 The targets for loan-to-deposit ratios were linked to the vulnerability of the bank's home country, as measured by external credit ratings, and range between 110% and 150%. The reason for using sovereign ratings as a criterion for the stringency of the loan-to-deposit ratio targets is to be found in the larger and more immediate need for banks in countries with lower credit ratings (and thus higher funding costs) to reduce their reliance on wholesale funding sources. At the same time, it should be noted that using a loan-to-deposit ratio to gauge the extent of the deleveraging needed can be biased, given that banks in some countries rely on other stable sources of funding such as bonds subscribed to by retail customers and long-term covered bonds.

14 The scale of the plans was capped at 75% in order to reflect potential implementation risks, implying that it may not be possible for banks to complete the plans to the full extent announced and within the two-year horizon. Moreover, it is important to note that most of the plans were announced in the second half of 2011, a period of severe distress; hence, it is not unlikely that at least some of the plans will be watered down as market conditions improve.

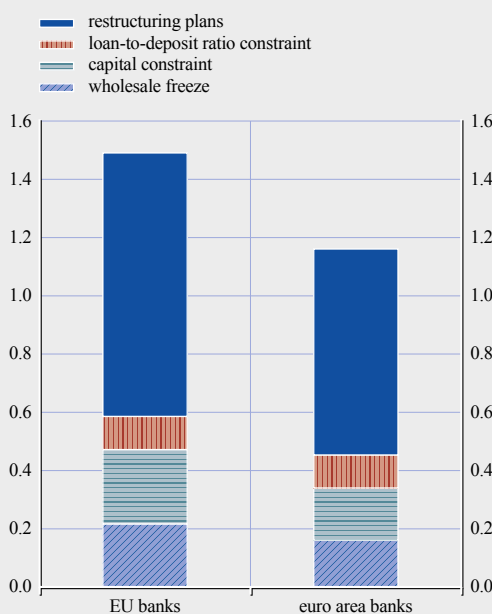
Overall, these constraints imply an estimated total deleveraging of EU banks in the order of €1.5 trillion by the end of 2013; and €1.2 trillion if only euro area banks are included (see Chart A.5).¹⁵

A key concern for policy-makers as regards EU banks' deleveraging is that the credit supply to the real economy will be restricted, with adverse implications for the economic recovery. In particular, given their relatively short-term nature, non-financial corporate loans could be vulnerable to a forced or rapid deleveraging process.¹⁶ Bank credit is especially important for small and medium-sized enterprises (SMEs),¹⁷ which – unlike larger firms – typically do not have recourse to financial markets and may be dependent on banks renewing their loans.¹⁸ This notwithstanding, it is likely that most of the deleveraging will be carried out via sales of assets and non-core activities to third parties, as corroborated by the restructuring plans announced by banks. The direct impact on the provision of credit to the non-financial sectors, and thus on real economic activity, is likely to be relatively muted.

In addition, in assessing the deleveraging process and addressing the question as to whether it is “excessive” in the sense of reinforcing the business cycle, it is crucial to distinguish between the various underlying factors. Ideally, this requires a disentangling of loan demand and supply factors, which is inherently difficult. Moreover, with respect to the loan supply factors, a distinction should be made between more cyclical factors (such as the firm-specific outlook, collateral values and the general economic outlook) and factors related to the soundness of banks' balance sheets (such as capital and liquidity positions, as well as access to funding markets).¹⁹ As argued above, deleveraging caused by cyclical factors would typically reflect a natural process related to the turn of the business cycle, although financial frictions, such as asymmetric information between banks and borrowers, may amplify the process.²⁰ Deleveraging triggered by constraints to banks' balance sheets – such as funding and capital pressures, and regulatory changes – would add to the cyclical factors, exacerbate

Chart A.5 EU bank deleveraging estimates

(2012–2013; EUR trillions)



Sources: ECB and ECB calculations.

Note: The sample includes 70 large and medium-sized EU banks, corresponding to the EBA sample for the 2011 Capital Exercise.

... leading to concerns that deleveraging may result in credit supply constraints...

... although asset reductions are also likely to reflect cyclical and demand-driven effects

15 These figures are somewhat lower (by around USD 600 billion) than the estimates reported in the IMF's Global Financial Stability Report of April 2012. This discrepancy is mainly attributable to the more conservative assumptions applied, for example, with respect to the scale of the restructuring plans, the impact of the two three-year LTROs and the wholesale funding constraints. Similar to the IMF calculations, the impact of fire sales in the case of synchronised deleveraging was not accounted for.

16 In the euro area, one-third of the outstanding stock of loans to non-financial corporations is due to mature within a year.

17 SMEs account for 99.8% of the number of firms in the euro area, for 60% of the total turnover and for 70% of total employment.

18 A study on US firms has shown that credit constraints were the most important factor in predicting which small firms went out of business between 2004 and 2008 (see T.L. Mach and J.D. Wolken, “Examining the Impact of Credit Access on Small Firm Survivability”, *Finance and Economics Discussion Series Working Paper*, 2011-35, Federal Reserve Board, 2011).

19 For a discussion of loan supply and demand effects, see ECB, “Monetary policy and loan supply in the euro area”, *Monthly Bulletin*, October 2009.

20 See B.S. Bernanke and M. Gertler “Agency Costs, Net Worth, and Business Fluctuations”, *The American Economic Review*, Vol. 79, No 1, 1989; and B.S. Bernanke, M. Gertler and S. Gilchrist, “The Financial Accelerator and the Flight to Quality”, *The Review of Economics and Statistics*, Vol. 78, Issue 1, 1996.



There is a potential “home bias” in deleveraging strategies

EU banks’ cross-border deleveraging may be particularly severe in CESEE countries...

... where EU banks play a predominant role

Recent policy initiatives seek to mitigate the impact on CESEE countries

the process and lead to financial market tensions and credit disruptions. According to the ECB’s bank lending survey, both loan supply and loan demand factors currently suggest some deleveraging by euro area banks.

IS BANK DELEVERAGING AFFECTING OTHER REGIONS?

In situations where a bank is confronted with the need to reduce assets in order to strengthen its capital position, it tends to shed its foreign assets first.²¹ The vulnerability of host countries to foreign deleveraging depends on a number of factors, including the prevalence of foreign banks in the home banking sector, foreign bank reliance on funding from outside the host country, the nature of lending (short-term versus long-term loans) and the scope for local or other foreign banks to fill the gap.

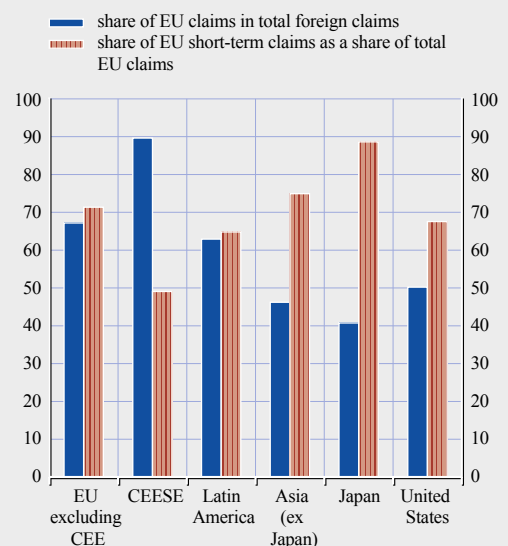
One region in which international banks, almost exclusively from the EU, play a prominent role is central, eastern and south-eastern Europe (CESEE) (see Chart A.6).²² Hence, economies in this region could be comparatively strongly affected by EU banks scaling down their international activities. It may, however, be argued that the impact of deleveraging in these countries would be mitigated if banks take a “regional” rather than a “home” perspective. Moreover, EU banks may treat this region as strategic, owing to its growth and profit potential in the light of the ongoing economic catching-up process. Furthermore, in certain countries, domestic loan-to-deposit ratios are quite low, implying that subsidiaries of foreign banks are using domestic deposits to fund lending. In addition, it is noticeable that EU banks’ exposures to CESEE tend to be of a longer-term nature, and thus less prone to abrupt deleveraging, than their exposures to other regions.

The global crisis triggered an unwinding of the internal and external imbalances accumulated in the CESEE countries in the boom years, with claims of EU banks on all CESEE countries except Turkey declining by 3% to 40%. At the same time, lending contracted in those CESEE countries that had the highest domestic loan-to-deposit ratios and that recorded the most marked declines in foreign claims (Latvia, Lithuania and Hungary), while loans still increased in the remaining countries (see Section 1).²³

Various policy initiatives have been launched with the aim of mitigating the risk of disorderly deleveraging affecting the CESEE region. At the March 2012 meeting of the European Bank Coordination (“Vienna”) Initiative, a number of

Chart A.6 The share of EU bank claims in selected external regions’ total foreign claims

(Q4 2011; percentages)



Sources: BIS and ECB calculations.

21 See S. Herrmann and D. Mihaljek, “The determinants of cross-border bank flows to emerging markets: new empirical evidence on the spread of financial crises”, *Working Paper*, No 315, Bank for International Settlements, 2010.

22 This region includes both non-euro area EU Member States and several non-EU countries, e.g. Turkey.

23 In Hungary, the sizeable loan contraction was also a by-product of the government allowing households to repay foreign currency mortgages at very favourable exchange rates.

euro area parent banks and the relevant authorities agreed on a set of principles designed to enhance cooperation and coordination, recognising that the “stability of the financial sector and ensuring orderly credit conditions in emerging Europe are in the shared interest of the private sector and home and host countries”.²⁴ These developments, however, should not lead to complacency in the region, as country-specific factors may still lead to significant loan deleveraging by parent banks in the future.

24 For further information, see http://ec.europa.eu/economy_finance/articles/governance/2012-03-13-ebci_en.htm.

Box

UNDERSTANDING CROSS-BORDER BANKING CLAIMS IN REAL TIME

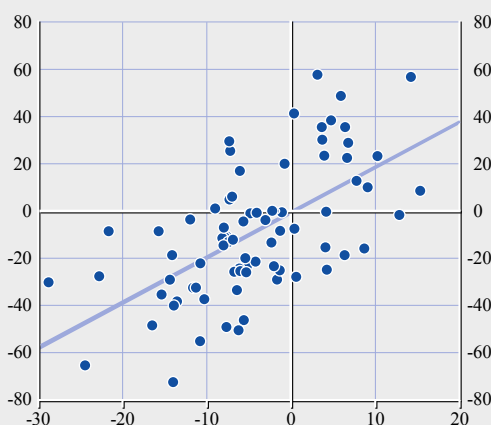
In the absence of timely data, this box assesses current changes in cross-border bank claims by looking at cyclical indicators that are available in real time. The evidence presented in this box suggests that deleveraging pressures on euro area banks may have been somewhat stronger in late 2011 and early 2012 than for those in other advanced economies.

Data to assess the size of international bank deleveraging are scarce and subject to publication lags. The most reliable data come from the Bank for International Settlements (BIS), but are published with a lag of around four months. One way to gauge cross-border bank lending in a timelier manner is to examine its contemporaneous relationship with factors that affect banks’

Chart A Banks’ equity prices and international bank claims

(Q3 2008 – Q2 2009; percentages)

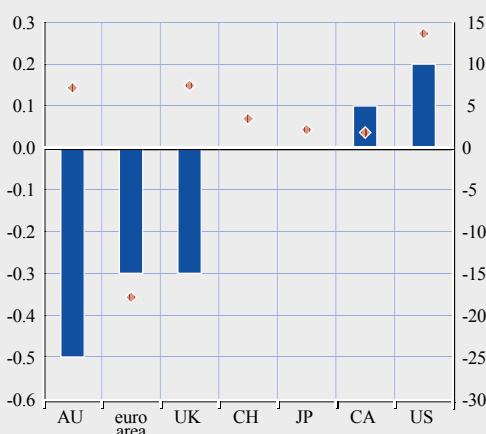
x-axis: international bank claims
y-axis: bank equity prices



Sources: Thomson Reuters, ECB and ECB calculations.
Note: Non-MFI sector excluding general government.

Chart B Recent bank equity price performance and 2012 GDP forecast revisions

— change in GDP forecast (percentage points; left-hand scale)
♦ change in bank equity prices (percentages; right-hand scale)



Sources: Thomson Reuters and Consensus Economics.
Notes: The change in GDP refers to the difference between the 2012 annual GDP growth forecasts of December 2011 and May 2012. The bank stock price represents the percentage changes between 31 December 2011 and 15 May 2012.

Concerns about the implications of EU bank deleveraging...

... and recent evidence point to tighter credit standards on trade finance...

... which is also linked to EU banks' difficulties in securing US dollar funding

EU banks have large market shares in global trade finance...

cross-border lending decisions and to derive projections for cross-border bank activity from these factors. Bank equity prices are one such factor that is a good summary measure for leverage determinants, such as conditions in funding markets and broad macroeconomic prospects.

Chart A confirms that there was a contemporaneous co-movement between banks' equity returns in the creditor country and changes in banks' international claims in late 2008 and early 2009. During this period, banks sharply reduced their leverage as it became more difficult to raise funds in the wholesale and securitisation markets, with pressure on banks' capital positions mounting at the same time.

Chart B shows that bank stock prices in the euro area currently stand well below the levels recorded at the end of 2011, while those of banks in other advanced economies were broadly unchanged. At the same time, the global macroeconomic outlook has worsened. This would suggest that deleveraging pressures on euro area banks are likely to have been somewhat stronger than in other major economies in recent months.

A concern for non-EU economies regarding EU bank deleveraging is that bank trade finance²⁵ will be adversely affected, as EU banks account for one-third of the global supply.²⁶ The results from the annual IMF/BAFT-IFSA Trade Finance Survey²⁷ indicate that since the outbreak of the crisis global banks, in particular large banks, have significantly tightened their credit standards on trade finance loans and have increased the cost of such credit against a backdrop of increasing demand. Trade finance is an area in which Asian economies, in particular, are quite dependent on EU banks. As trade finance loans tend to be short-term in character, this is an area where EU banks could quickly decrease their exposure. Although the restructuring plans announced by EU banks do not place a disproportionate focus on trade finance, there is evidence that EU banks are indeed reducing their exposure to this form of credit in Asian markets. For example, data from the Hong Kong Monetary Authority for December 2011 show that EU banks decreased their outstanding trade finance loans in Hong Kong by 20% in a single month.²⁸ There are indications that local banks have stepped in as EU banks have scaled down operations in Asia, but concerns have been raised regarding the scope for further substitution.²⁹

Reflecting the heightened difficulties faced by banks in securing US dollar funding, a number of banks are targeting reductions in US dollar assets to alleviate funding strains. The United States accounts for almost a fifth of EU banks' foreign claims. However, the importance of EU banks for the financing of the US economy is modest. In addition, plans to reduce US dollar assets tend to focus on investment banking assets.

CONCLUDING REMARKS

Deleveraging by EU banks is to be expected over the medium term. There are concerns that the process will adversely affect the supply of credit to the real economy. Such concerns are more

25 Bank trade finance accounted for 35% to 40% of total trade finance in 2008 (World Bank, "Trade Finance During the Great Collapse", 2011).

26 R. Menon, Keynote Address presented at the Investment Management Association of Singapore 13th Annual Conference, 14 March 2012.

27 BAFT stands for Bankers' Association for Finance and Trade and IFSA for International Financial Services Association.

28 This decline can reflect both demand and supply factors, given the deterioration in economic activity.

29 This is attributable to, inter alia, Asian banks' already elevated US dollar loan-to-deposit ratios, risk aversion, technical constraints and counterparty limits (see R. Menon, *op.cit.*).

relevant for the euro area than for other large economies, owing to the predominant role of banks in the euro area financial system. The non-standard measures introduced by the Eurosystem to ensure an adequate provision of liquidity to the euro area banking system have helped to avoid a rapid and disorderly deleveraging process, thus mitigating the macroeconomic implications. Moreover, it is likely that the real economic impact of EU banks' deleveraging plans will diminish as the assets are sold to third parties and activities are taken up by other financial institutions, such as other banks, insurance corporations and pension funds.

Concerns have also been raised regarding the impact of deleveraging on external economies, given the likelihood that banks will adopt a "pecking order" in asset reductions, focusing on external assets and largely sheltering domestic assets. This view is corroborated by the restructuring plans announced by banks. The impact of European banks' deleveraging plans on external economies, particularly in the CESEE countries, will depend on the ability of local and other foreign banks to "fill the gap". A number of features particular to the regions both increase and mitigate their vulnerability. While European banks have a dominant position in the banking sectors of CESEE countries, most of the loans they supply are long-term, and loans are largely funded by local deposits in many countries. In addition, for strategic reasons, EU banks may be reluctant to significantly scale back their involvement in CESEE countries unless strictly necessary. As regards Asia, in aggregate, these economies are not very dependent on funding from European banks, except in the area of trade finance, which mostly tends to be short-term. The United States accounts for a significant proportion of European banks' foreign claims, and bank restructuring plans tend to target US dollar assets on account of an impaired access to US dollar funding. However, the importance of European banks for the financing of the US economy is quite insignificant and hence the real economic implications should generally be limited.

Policy actions on deleveraging can help to mitigate risks to the real economy. However, the benefits of intervention must be weighed against the cost of interfering with banks' independent business decisions, potentially introducing distortions and delaying a necessary restructuring process. A key risk is that uncoordinated domestic policy actions will trigger financial protectionism. Given the cross-border nature of the current deleveraging process, policy responses should be aimed at mitigating the overall impact. A number of actions aimed at reducing the risks surrounding EU bank deleveraging have been taken thus far. First, the Eurosystem introduced a number of measures in December 2011, including two three-year LTROs, which substantially eased the funding pressures of banks located in the euro area, thereby mitigating the risk of a rapid and disorderly deleveraging process. Second, a European Bank Coordination ("Vienna") Initiative was announced in March 2012 whereby authorities in the home and host countries plan to coordinate policy actions to mitigate the impact of European bank deleveraging on credit conditions in CESEE countries. Finally, plans by EU banks to address the capital shortfalls identified in the EBA's 2011 EU Capital Exercise are being closely monitored by the supervisory bodies to ensure they do not have an adverse impact on the supply of credit, both inside and outside the euro area.

*... but many
mitigating factors...*

*... and policy
actions are being
taken to ensure
an orderly and
benign deleveraging
process*

B LIQUIDITY REGULATION AS A PRUDENTIAL TOOL: A RESEARCH PERSPECTIVE

In response to the flaws in banks' liquidity risk management revealed by the global financial crisis, the Basel Committee on Banking Supervision has proposed a new set of liquidity requirements to complement its revised capital requirements framework. This special feature reviews, from a research perspective, the role of liquidity requirements in mitigating not only liquidity risks, but also solvency risks in banking. It highlights how liquidity requirements differ from capital requirements and discusses how selected features of the Basel III liquidity rules can help to reap the benefits of liquidity outlined by research theories.

INTRODUCTION

*New
Basel III liquidity
standards...*

The recent financial crisis provided a vivid illustration of how the materialisation of liquidity risk¹ in some parts of the financial system can lead to the drying-up of liquidity in entire market segments, such as unsecured interbank markets, causing a system-wide scramble for liquidity. Central banks had to step in and provide vital liquidity lines in order to prevent liquidity shortages from turning into solvency problems for financial institutions.

In response to the recent global financial crisis, the Basel Committee on Banking Supervision proposed, in December 2010, a new set of liquidity requirements to complement its revised capital requirements framework.²

*... are designed
to mitigate banks'
liquidity risk*

This new set of liquidity standards is designed to mitigate adverse systemic effects and is expected to yield substantial macro-prudential benefits. Indeed, the new requirements are expected to lead to an increase in credit institutions' liquidity buffers and to reduce the risks posed by maturity transformation and interconnectedness in the financial system. Importantly, they should also reduce information asymmetries concerning banks' risks, including banks' liquidity risk exposure and liquidity risk-bearing capacity, which should improve the efficiency of interbank markets.

In the medium term, the aim of the liquidity requirements is to encourage all banks to have business models that allow them to limit their liquidity risk and fulfil liquidity standards without a disproportionate and unduly long-term dependence on central bank funding.³

*Liquidity
requirements may
also limit solvency
risk...*

This special feature argues that the role of liquidity requirements can be viewed not just as an insurance policy for dealing with liquidity risk, but also as a prudential regulatory tool alongside other requirements, such as capital, which has important consequences for limiting solvency risk and encouraging good risk management in financial institutions.

*... facilitating
banks' access to
funding*

Systemic liquidity crises, historically and in the recent past, are often driven by asymmetric information about the possibility that one or more financial institutions may be insolvent.⁴ This can trigger a drying-up of liquidity in the funding markets in which financial institutions participate, e.g. the unsecured asset-backed commercial paper and repo markets. In other words, solvency risk and liquidity risk are intrinsically linked. From this perspective, one way to help prevent a liquidity

1 Liquidity risk is the risk that a solvent bank is unable to meet its cash flow needs using its own stock of liquidity and borrowed funds without materially affecting its daily operations or overall financial condition.

2 Basel Committee on Banking Supervision, "Basel III: A global regulatory framework for more resilient banks and banking systems", December 2010 (revised version of June 2011).

3 The interlinkages between the liquidity requirements and central bank funding are an important strand of the Basel Committee work. It is of crucial importance to ensure that liquidity ratios do not hinder or conflict with central bank policies.

4 See, for example, ECB, "Liquidity hoarding and interbank market spreads", *Financial Stability Review*, June 2009.

crisis would be to establish a combination of prudential requirements ensuring, inter alia, that liquidity risk stemming from uncertainty about bank solvency is substantially mitigated.

This special feature is structured into three sections. The first section provides a research perspective on the role of liquidity as a prudential tool to mitigate risk, focusing on the less debated issue of how liquidity differs from capital. Before the recent crisis, the regulatory debate focused largely on capital requirements, directed at ensuring the solvency of financial institutions. This section highlights how liquidity holdings can contribute to financial stability in ways that are complementary to capital. The second section discusses how selected key features of the Basel III liquidity rules can help reap the theoretical benefits of liquidity in practice. The third section concludes with an overview of the issues discussed and outlines the importance of ensuring a consistent implementation of the prudential requirements across jurisdictions.

RESEARCH ON LIQUIDITY AS A RISK MITIGATOR

One of the key functions performed by banks in the economy is maturity transformation, i.e. banks typically take in deposits or obtain short-term funding in wholesale markets and use these funds to make longer-term investments. On the liabilities side, deposits can be withdrawn on demand, thus providing depositors with valuable flexibility in making payments as they need. Similarly, short-term market funding may not be rolled over when it comes due. On the assets side, long-term investments are often risky and illiquid in that their liquidation before maturity entails a loss. Maturity transformation gives rise to liquidity risk since, by definition, an entity engaging in maturity transformation cannot honour a sudden request for full withdrawals.

In their lending and investment activities, banks also perform an important function of overcoming information asymmetries. For example, banks create and invest in complex, information-intensive assets, select suitable borrowers to provide financing and use resources to monitor a borrower's activities over the lifetime of a loan, thus enhancing the probability of loan repayment. The private information inherent in bank investments makes banking itself an opaque business. Moreover, the very nature of banking business leaves banks exposed to credit risk (a possibility that some loans will not be repaid, for example) which may, ultimately, jeopardise banks' ability to repay their investors.

The resulting uncertainty about a bank's solvency can indeed trigger withdrawals of funds, or a "run". This may require liquidation of illiquid investments and, in turn, lead to insolvency. Given such powerful feedback effects between solvency risk and liquidity risk in banking, it is natural to ask whether liquidity can help to mitigate these risks. This is of key importance as the failure of one bank can impose externalities on other banks through, for example, fire-sales and financial contagion.⁵ Weakness in the banking sector can also affect the functioning of the entire economy through the supply of bank loans, with a potential over-investment in upturns and an abrupt tightening of the credit supply in downturns.⁶

With regard to potential mitigators of bank risks, both equity capital and liquidity buffers can, in principle, fulfil this role. Indeed, in the canonical Black-Scholes-Merton

Banks face liquidity risk...

... and solvency risk...

... and these risks are intrinsically linked

Both liquidity buffers and capital mitigate bank risks...

⁵ See, for example, V. Acharya and S. Viswanathan, "Leverage, moral hazard, and liquidity", *Journal of Finance*, Vol. 66, Issue 1, 2011; F. Allen and D. Gale, "Financial contagion", *Journal of Political Economy*, Vol. 108, No 1, 2000; and M. Brunnermeier and L.H. Pedersen, "Market liquidity and funding liquidity", *Review of Financial Studies*, Vol. 22, No 6, 2009.

⁶ For example, T. Adrian and H.S. Shin, "Financial intermediaries, financial stability, and monetary policy", *Federal Reserve Bank of New York Staff Reports*, No 346, 2008; and C. Borio and P. Lowe, "Asset prices, financial and monetary stability: exploring the nexus", *BIS Working Paper Series*, No 114, 2002.

... but liquidity can
be complementary
to capital

framework,⁷ both greater holdings of safe liquid assets and greater reliance on equity finance can reduce bank risk. *Ceteris paribus*, allocating more funds to safe liquid assets reduces asset risk in terms of the volatility of asset returns, while increasing equity reduces solvency risk for any given level of asset risk. As a result, there is no unique optimal combination of cash-to-assets and equity-to-assets ratios in this framework and the goal of controlling bank risk can be achieved through many different combinations of the two.

The Black-Scholes-Merton framework rests on some key assumptions, however. There are no transaction or information costs, all information that can be known is known equally by all parties, and there is no liquidity risk as all securities are perfectly liquid and can be liquidated without incurring any costs.

When these assumptions are modified, the effects of liquidity holdings and equity capital on bank risk are no longer the same.

For example, deviating from the assumption that all securities are equally and perfectly liquid and, instead, explicitly considering the liquidation costs of banks' long-term investments can motivate the holding of liquidity buffers. Liquidity buffers reduce the costs of premature liquidation and thus mitigate liquidity risk, which can arise as a result of depositors' requests for early withdrawal of funds or investors' refusal to roll over maturing debt.⁸ Liquidity holdings can also protect banks against early withdrawals motivated by wrong information about the outcome of banks' risky investments.⁹ Without holding liquidity, banks offering demandable deposits would subject themselves unnecessarily to a costly liquidation of their portfolio in the event that they fail to meet withdrawals, even though the outcome of their risky investments is actually favourable.

Another departure from the Black-Scholes-Merton framework is to allow for an asymmetry of information between banks and investors, which leads to a potential conflict of interests between the two. Such a conflict of interests may arise when banks are opaque and outside investors providing funds cannot assess the quality of the bank's risk management in real time.¹⁰ In this case, banks may have incentives to take on excessive risks.

Holding liquidity buffers in addition to equity capital might reduce banks' incentives to take on too much risk. Liquidity helps to better align banks' incentives with the interests of their investors because holding safe liquid assets limits the extent to which investors lose from high-risk investment strategies.

When banks are opaque and their long-term investments illiquid, three potential benefits of liquidity in comparison with capital can be highlighted.¹¹

First, **maintaining liquidity buffers in advance saves on liquidation costs**. Liquidity buffers can help to avoid costs of a premature liquidation of long-term investments, and to prevent fire-sale externalities and financial contagion. During financial crises, when assets can be liquidated or sold

7 See, for example, R.C. Merton, "On the pricing of contingent claims and the Modigliani-Miller theorem", *Journal of Financial Economics*, Vol. 5, 1977.

8 See D. Diamond and P. Dybvig, "Bank runs, deposit insurance, and liquidity", *Journal of Political Economy*, Vol. 91, 1983; and Z. He and W. Xiong, "Dynamic debt runs", *Review of Financial Studies*, forthcoming.

9 C. Calomiris and C. Kahn, "The role of demandable debt in structuring optimal banking arrangements", *American Economic Review*, Vol. 81, 1991.

10 As in J. Tirole, *The Theory of Corporate Finance*, Princeton University Press, 2006.

11 This analysis is based on C. Calomiris, F. Heider and M. Hoerova, "A theory of bank liquidity requirements", Twelfth Jacques Polak Annual Research Conference, International Monetary Fund, Washington, DC, 10-11 November 2011.

only at a significant loss, even a large capital buffer may be insufficient to prevent contagion between financial institutions. In this case, liquidity requirements can help to internalise some of the negative externalities that are generated by the price impact of selling in a falling market, and lower banks' market liquidity risk.¹²

Second, **the value of safe liquid assets is generally readily observable while the value of capital is not.** The value of capital depends on the value of risky assets held by banks. Safe liquid assets can play a doubly important role in banking, not just because of their low risk, but because their value can be easily assessed and agreed upon by banks' counterparties, should such a need arise (e.g. in bankruptcy). This may not hold true for all bank assets, some of which may be complex and the value of which can only be determined at some cost (time, auditing, etc.).

Third, **by investing in safe liquid assets, banks commit to removing solvency risk from a portion of their portfolio.** Such a commitment affects the way banks' counterparties, who lack precise information about banks' assets and behaviour, view the risk management of banks. This makes it easier for banks to obtain financing from, for example, retail depositors or interbank markets, thus lowering banks' funding liquidity risk.

In sum, in an environment in which some of the banks' investments are illiquid and the quality of bank risk management is not observable by outside investors,¹³ both liquidity and capital can affect the solvency and liquidity risk of a bank. Managing bank risk can no longer be achieved through many different combinations of liquidity and capital, as in the Black-Scholes-Merton framework. The optimal combination of liquidity buffers and equity capital minimises the overall costs associated with early liquidation, curbs incentives for bad risk management and balances the benefits of holding liquidity with the opportunity costs of liquidity that stem from foregone long-term investment opportunities.

Bank counterparties, such as depositors or other financial institutions, who are exposed to the consequences of banks' negative performance, may exert sufficient market discipline to ensure that banks voluntarily choose socially optimal liquidity holdings. In this case, there would be no need for explicit regulation. However, in the presence of externalities, such as fire sales, a bank's private choice of liquidity buffers will not reflect what is socially optimal.¹⁴

Similarly, an expectation of public sector support for banks in a crisis can distort the incentives faced by financial institutions and their counterparties. Owing to such undesirable moral hazard consequences, the liquidity buffers chosen by banks could again be insufficient and too low.¹⁵ Such considerations call for regulators to set and enforce rules that implement socially optimal prudential standards. This will be discussed in the next section.

Value of liquid assets is readily observable

Liquidity holdings help align interests of banks and investors

Liquidity regulation necessary owing to externalities or distorted bank incentives

12 R. Cifuentes, G. Ferrucci and H.S. Shin, "Liquidity risk and contagion", *Journal of the European Economic Association*, Vol. 3, Issue 2/3, 2005.

13 While it is impossible to fully eliminate information asymmetries, progress has been made in recent years in the field of information disclosure of risk management data, practices and governance (namely concerning counterparty and risk management information).

14 See, for example, E. Perotti and J. Suarez, "A Pigovian approach to liquidity regulation", *International Journal of Central Banking*, Vol. 7, 2011.

15 Recent papers considering the effects of government bailouts on banks' maturity mismatch and financial stability include E. Farhi and J. Tirole, "Collective Moral Hazard, Maturity Mismatch, and Systemic Bailouts", *American Economic Review*, Vol. 102, No 1, 2012; and T. Keister, "Bailouts and Financial Fragility", *Federal Reserve Bank of New York Staff Reports*, No 473, 2010.

The Basel Committee has proposed two new liquidity standards: LCR and NSFR

Use of the buffer in times of stress can help prevent a systemic liquidity crisis

Eligible liquid assets must satisfy certain criteria

REAPING THE BENEFITS OF LIQUIDITY THROUGH REGULATION

In response to the inadequacy of banks' liquidity risk management practices that was exposed by the financial crisis, in December 2010 the Basel Committee proposed two new standards establishing minimum levels of liquidity: the **liquidity coverage ratio (LCR)** which aims at ensuring that banks hold sufficient high-quality liquid assets to withstand an acute stress scenario lasting one month; and the **net stable funding ratio (NSFR)** which increases incentives for banks to fund themselves using more stable sources on a structural basis.¹⁶

This section expands on selected features of the liquidity requirements as outlined by the Basel Committee, focusing on how they can help to reap the potential benefits of liquidity as a risk mitigator.

Building up liquidity buffers that can be used in times of stress

Similarly to the buffer components in the capital regulation, such as the counter-cyclical capital buffer, a framework allowing the liquidity buffer to be used in times of stress is of crucial importance. This relates to the systemic benefits of banks holding liquidity buffers, namely the prevention of fire-sale externalities and financial contagion, as explained in the previous section.

Although such a proposal is not yet embedded in the Basel III text, work to develop such rules is ongoing at the Basel Committee. The aim is to allow banks to make use of their stock of liquid assets, without stigma, in the event of a liquidity shock, i.e. thereby temporarily falling below the 100% minimum requirement.

Indeed, this component of the liquidity regulation is not only important for micro-prudential reasons, but also from a wider market and systemic perspective. If the liquidity buffer could never be released, the LCR requirement would act pro-cyclically and could worsen the impact of liquidity shocks, as banks would be unable to use their liquid assets in response to a shock. This could lead to liquidity hoarding at a time when it is the most detrimental from a system-wide perspective, i.e. when liquidity dries up.

In addition to allowing banks to draw on their liquid assets in times of stress, the LCR could be applied in a dynamic manner to ensure counter-cyclical effects. For example, a time-varying ratio – where the minimum requirement could be set above or below 100%, depending on cyclical or structural shifts in banks' liquidity risks – could help to “lean against the wind” when liquidity is abundant and provide a valuable buffer for banks to use when liquidity becomes scarce.

Requiring holdings of high-quality liquid assets

A cornerstone of the liquidity regulation and specifically the LCR is the requirement for banks to hold a minimum level of high-quality liquid assets to withstand a stress scenario lasting 30 days.

This relates to the important role that holdings of safe liquid assets play in banking, particularly as regards their observability and ease of valuation.¹⁷

Eligible liquid assets in the Basel III liquidity regulation must satisfy certain criteria, namely be safe, liquid in private markets, central bank eligible in normal times and resilient in a crisis. These criteria

¹⁶ The liquidity standards are currently under observation until their implementation (2015 for the LCR and 2018 for the NSFR).

¹⁷ Liquid assets should allow for an easy valuation using widely accepted valuation models that can be run with publicly available data and that do not depend on strong assumptions. As a result, complex or exotic products would not qualify as liquid.

are linked to two key objectives of the liquidity regulation: (i) banks should rely on their own ability to raise the necessary funding in normal circumstances and in times of stress, thus internalising their liquidity risks and reducing excessive reliance on central banks as liquidity providers; and (ii) liquid assets must be convertible into cash at short notice, irrespective of a bank's own condition and market dislocations, without accepting large discounts or haircuts.

While an excessively broad definition of liquid assets would not achieve the aim of requiring banks to price their liquidity risks (as holding liquid assets may have an opportunity cost in terms of foregone higher returns), an excessively narrow definition could also have unintended consequences, namely risks of segmentation in certain asset markets and “cliff effects” (i.e. an abrupt market reaction due to situations in which an eligible liquid asset loses its eligibility owing to a rating downgrade, for example).

Cliff effects can cause instability in the sense that banks may not be able to comply with the LCR if a security on which they are relying suddenly “loses” its eligibility. At the same time, banks could pre-emptively sell “close-to-the-cliff” securities, causing downward pressure on their price. The more gradualist the approach towards the liquidity buffer, the less the risk of cliff effects and related adverse effects on banks' liquidity management and the financial markets. In practice, this would mean incorporating gradual quantitative, market-based metrics to either replace or supplement the risk weights and rating-based criteria for determining the eligibility of liquid assets in the regulation.

Moreover, the pool of liquid assets should be composed of diversified assets that can withstand different types of shocks. Such diversification would help to limit concentration risk and ensure that the objectives of the liquidity buffer can be fulfilled under a broad set of circumstances.¹⁸

Establishing appropriate liquidity disclosure rules

As highlighted in the previous section, reducing information asymmetries regarding banks' risks through transparent holdings of liquid assets should help to make banks more resilient. If markets are aware that banks hold a buffer of high-quality liquid assets, proportionate to the liquidity risks taken, this should inspire confidence and reduce liquidity risk to individual banks and the banking system as a whole.

In practice, however, establishing appropriate disclosure rules for banks' liquidity positions is challenging, given the complex trade-off that exists between the potential stabilising effects of such disclosure in normal times and the potential destabilising effects in a stress situation.

Disclosure enhances transparency and may strengthen market discipline. In times of stress, it can reduce pro-cyclicality by easing investor uncertainty as regards counterparty risks. However, publicly disclosing liquidity positions in a stress environment (where they may fall below the minimum threshold) could also increase pro-cyclicality, especially if investors are not sufficiently aware that banks can draw from the liquidity pool in these times.

This is another important area where work is ongoing at the Basel Committee.

Disclosure rules are crucial to maximise positive externalities and minimise destabilising effects in a crisis

¹⁸ The Basel III liquidity rules allow for some diversification in the pool of liquid assets by allowing level 2 assets to account for only 40% of the total and by providing qualitative guidance on diversification within asset classes.

An appropriate calibration of banks' liquidity mismatches will help address vulnerabilities revealed by the crisis

Calibrating cash inflows and outflows

As discussed in the previous section, the degree of uncertainty in covering mismatches between future cash outflows and cash inflows is particularly high in banking. A key aspect of the financial crisis was banks' over-reliance on short-term unsecured market funding to finance illiquid assets. The ability to roll over this funding proved to be fragile and heavily reliant on market confidence, giving rise to negative risk externalities when this funding dried up. To address these vulnerabilities, the liquidity regulation aims to determine the behaviour of banks' cash inflows and outflows in a stress situation – particularly over the critical time horizons of one month and one year – in order to better match the maturity of banks' assets and liabilities.¹⁹

To achieve this, stress factors, e.g. run-off rates, are applied according to the characteristics of banks' assets, liabilities and type of counterparty. In particular, the Basel framework distinguishes between more stable sources of funding, e.g. retail savings, secured funding and deposits from small and medium-sized companies, and more volatile funds, such as unsecured wholesale funding. Each funding type thus receives run-off factors that reflect the risk of withdrawal based on empirical evidence.

A probable impact of this is that the relative size of funding markets for different sources and maturities may change, an aspect which needs to be carefully assessed.

Interaction with the central bank operational framework

Given the crucial role that central banks play in providing liquidity to banks, the treatment of central bank operations in liquidity regulation is of great importance. The liquidity ratios are indeed likely to induce behavioural and market changes that can have consequences for central bank operations and monetary policy implementation. The nature and magnitude of such effects will depend on the design of each central bank's operating framework, which varies considerably across countries.

In the liquidity regulation, central bank eligibility is a necessary but not a sufficient criterion for inclusion in the buffer of liquid assets. There is therefore no complete alignment between the definition of liquid assets and the central bank's collateral framework. The underlying reason for this is that the LCR should encourage banks to self-insure against both idiosyncratic and systemic liquidity shocks by holding adequate cushions of liquid assets providing the first line of defence against liquidity stress. This is an important safeguard against moral hazard and the reduced market discipline that could otherwise result and reflects the principle that the central bank is the lender of last resort, not the lender of first resort. Moreover, this is a natural outcome of an international rule that needs to apply in different monetary policy operational frameworks. At the same time, the LCR should not compromise central banks' ability to achieve their monetary policy objectives. Indeed, the LCR should support their ability to stabilise markets in times of stress. Key issues in this context are whether the LCR should differentiate between normal circumstances and times of stress, for example by accounting for the capacity to borrow from the central bank as a liquid asset in times of stress or by setting higher rollover rates for central bank facilities in times of crisis; or whether rollover rates for central bank funding should be specific to the type of central bank facility used. Further work in this field seems warranted.

Overall, the complex interactions between the liquidity regulation and the central bank's operational framework suggest that neither of the two can be treated in isolation and that a complete alignment

¹⁹ While the LCR captures the short-term part of banks' maturity mismatch (30 days), the NSFR aims to address banks' longer-term structural liquidity mismatch by requiring a minimum amount of stable funding based on the liquidity characteristics of banks' assets over a one-year period.

Complex interactions are expected between liquidity regulation and central banks' operational frameworks

of the frameworks would not be desirable either. The regulation should instead recognise the interlinkages and respective purposes in order not to hinder the effectiveness of their functions. While it may be necessary, especially in the short term, for central bank operations to respond to changes in counterparty behaviour induced by the liquidity regulation, the new liquidity standards should result in greater resilience of the banking system over the longer run, with a positive net effect also on the implementation of monetary policy.

Limiting incentives for regulatory arbitrage

Finally, the incentives for regulatory arbitrage that will be generated by the liquidity requirements and the – unintended – consequences associated with these incentives also need to be considered. Regulatory arbitrage can be considered as “rent seeking” through the exploitation of loopholes in the regulation and can have harmful effects by reducing the overall strength of the standards or leading to outcomes inconsistent with the objectives by inducing banks to engage in certain transactions that they would otherwise not enter into, which could increase the vulnerability of the financial system.

A potential opportunity for arbitrage in the liquidity regulation is the ceiling on level 2 assets which limits the share of such assets to 40% of the total buffer. While the aim of this restriction is to ensure a minimum level of high-quality assets in the pool, the weaknesses identified on its operationalisation, which are under review by the Basel Committee, could allow banks to fulfil the LCR by undertaking securities financing transactions using level 2 or non-qualifying assets.

This is just one element of the regulation which illustrates that the potential for “playing” the standards exists and that supervisors need to remain on high alert to identify possible arbitrage transactions.

CONCLUDING REMARKS

This special feature highlights that liquidity and solvency risk are intrinsically linked in banking and argues that liquidity requirements, in addition to mitigating liquidity risk, can also have important consequences for limiting solvency risk and for encouraging good risk management in financial institutions. Liquidity requirements can be an especially useful means of mitigating bank risks in an environment in which some of the banks’ investments are illiquid and where information asymmetry exists between banks and their investors about the quality of bank risk management.

Holding liquidity buffers in addition to equity capital might reduce banks’ incentives to take on excessive risk by better aligning their incentives with the interests of their investors. This is because holding safe liquid assets limits the extent to which investors can lose from banks’ high-risk investment strategies. Moreover, liquidity holdings can help to save on liquidation costs, as well as prevent fire-sale externalities and financial contagion. The corresponding reduction of market liquidity risk and of information asymmetries regarding risk management in turn facilitates banks’ access to borrowing, thus lowering their funding liquidity risk.

Key features of the proposed Basel III liquidity rules include a proposal for using the stock of liquid assets in times of stress, which enhances the systemic benefits of holding liquidity buffers, namely the prevention of fire-sale externalities and financial contagion. The definition of what constitutes “safe and liquid assets” is also crucial, ensuring that eligible assets are easy to observe and value. Holding these instruments should result in banks internalising their liquidity risk and reduces the reliance on central banks as liquidity providers. Theory also points to the positive effects of

Supervisors must be alert to incentives for regulatory arbitrage and related consequences

Holding liquidity may improve banks’ risk management incentives...

... and lower banks’ market and funding liquidity risks

disclosing banks' liquidity positions, mainly in terms of reducing information asymmetries between counterparties. In practice, however, care needs to be taken as regards the potentially destabilising effects of such disclosure in a stress situation. Carefully designed scenarios regarding banks' inflows and outflows over an appropriate time horizon, particularly under stressed conditions, are also key to minimising banks' funding liquidity risk. Lastly, the regulation must recognise the complex interactions with central bank operations and support central banks' ability to stabilise markets in times of stress.

*First harmonised
rules on liquidity*

In contrast with international bank solvency standards which date back to the 1980s, liquidity requirements have so far escaped international harmonisation. Indeed, national prudential rules on liquidity, where they exist, differ substantially from country to country. The new Basel III liquidity standards therefore constitute the first instance of an international consensus on liquidity requirements.

*Consistent
implementation
across jurisdictions
is crucial*

In this context, further study of the interlinkages between capital and liquidity regulation, as well as the consistent implementation of the harmonised liquidity requirements across jurisdictions, are of key importance.

C EVALUATING INTERCONNECTEDNESS IN THE FINANCIAL SYSTEM ON THE BASIS OF ACTUAL AND SIMULATED NETWORKS

Multiple levels of analysis are required to assess banks' fragility in a complex banking system. On the one hand, network analysis using existing data for the euro area shows a banking structure which is well integrated across euro area countries, with some banks playing an important role at the euro area level while others have a more domestic focus. On the other hand, a dynamic network modelling approach can illustrate important aspects and fragilities of interbank activity in a simulated network in the absence of real micro data.

This special feature first describes a static approach to financial network analysis and then gives a specific illustration of a dynamic network in a stress-testing context. Both provide important insights for financial stability analysis. The static analysis of existing financial networks and the use of a simulated network for stress testing exploit information on the microstructure of banking activities to characterise the robustness of the banking sector to operating shocks. This is a unique application of conceptual and analytical techniques that have only recently been introduced in financial analysis.

INTRODUCTION

Network relationships in a financial context are exposures and liabilities recorded on or off balance sheet, or reflect financial activities in general. Mutual exposures of financial intermediaries are, on the one hand, beneficial as they generally allow for a more efficient allocation of financial assets and liabilities and are a sign of better diversified financial institutions. On the other hand, when large shocks affect the financial system, financial networks can accelerate the shock's initial impact by propagating it throughout the system. The unit of analysis in macro-prudential analysis has traditionally been at the level of countries and/or sectors, providing information on sources of fragility for the financial sector as a whole. However, as the recent crisis revealed the intrinsic dependence of stability on institution-level relationships, macro-prudential analysis has begun to focus on information concerning individual institutions.

Accordingly, one can view a financial exposure or liability within a network as a relationship (or edge) of an institution (node) vis-à-vis another whereby the relationship portrays a potential channel of transmission between institutions. This simple – or static – representation of a network does not specify how transmission mechanisms transfer shocks throughout the network and, in particular, makes no assumptions as to the institution's behaviour when confronted with a shock stemming from one of the relationships. A static network is therefore most valuable in its ability to summarise stylised facts of the network architecture as a whole, which can be very useful in macro-prudential analysis. Information derived from the static network includes the identification of central or systemic groups of institutions or nodes in the network. For example, one standard method of identifying the centrality of a node alone is the “between-ness” measure, i.e. the number of shortest paths from all nodes to all others that pass through that given node. Another method is eigenvector centrality, that is, a measure of the node's influence in the network, assigning relative scores to all nodes on the assumption that connections to high-scoring nodes contribute more to the score of the node in question than equal connections to low-scoring nodes. These and related network centrality measures enable a simple identification of systemic nodes and the general structure of a network. Observed over time, these measures can reveal the evolution of important aspects of the network relevant to its systemic robustness, identifying, for example, certain network vulnerabilities or its ability to dampen or exacerbate shocks.

Bank networks illustrate their interaction, highlighting positive aspects and potential fragilities

Some representations are static in that they focus on the structure of the relationship studied...

... while others
are simulated thus
facilitating the
modelling of specific
shocks

A second class of network models – those that are dynamic – imposes additional characteristics on the nodes. These characteristics allow the transmission of shocks across the system to be modelled.¹ Specifically, studying dynamic network models is justified by the substantial volatility of some financial networks. A trade-off between the richer nature and robustness of the results of the model and the specificity brought by the behavioural assumptions at the nodes is relevant. This is especially important when the behaviour at the nodes significantly impacts their systemicity or the vulnerability of the system as a whole. Therefore, it is particularly important to work in as general a model setting as possible, i.e. taking into account various possible network structures and looking at exogenous shocks from different angles. A notable example of this second class of models is used in the context of stress testing, whereby the response modelled at the nodes will allow risk maps of contagion effects of exogenous shocks to be formulated.

STRUCTURAL VULNERABILITY AND HIGH INTERCONNECTION IN CROSS-HOLDINGS OF BANK SECURITIES

A network rests on the definition of *who* (the nodes) and *what* (the links). Banks' interbank activity, at both the individual and the aggregate level, motivates the use of network analysis. At the country level, the Bank for International Settlements' consolidated banking statistics provide information on foreign bank claims which are a prominent and the most studied form of bank interconnection. Microstructure studies, however, concentrate on proprietary supervisory information and have a narrower national or market-specific context, depending on a wide range of links: claims and obligations computed from balance sheets², return correlations³, joint investment⁴, or the same pool of depositors⁵. In principle, various relationships between banks can be analysed, even simultaneously.

Structural issues relevant to financial surveillance

From a system perspective, the architecture of a network and its potential fragility support macro-prudential analysis in many ways. Different network structures can deal with shock propagation in different ways, and there are a number of measures to classify such network typologies. Notably for existing networks,⁶ Watts and Strogatz find that actual networks are generally highly clustered in groups adjacent to one another but not to other groups in the network.⁷ These are also known as *small-world* networks. The transmission of information within this structure is very quick and has been found to be important for spreading news, human disease and internet viruses.⁸ The forms of bank interaction, therefore, can illustrate how rapidly shocks can spread across classes of banks or across the banking sector, both nationally and internationally.

Structural
representations can
look at system
or bank-level
features to illustrate
different properties
of the network

- 1 Simulations depend on the strategic interaction of financial agents. Hence, understanding the relationships is essential to predict future outcomes, i.e. to limit – or possibly prevent – negative effects before they affect the whole system, including feedback mechanisms and realistic behavioural responses. A key challenge is specifying a network with different agents; see K. Anand et al., “Epidemics of rules, rational negligence and market crashes”, *European Journal of Finance*, forthcoming; O. Castrén and I. K. Kavonius, “Balance sheet interlinkages and macro-financial risk analysis in the euro area”, *ECB Working Paper Series*, No 1124, 2010; and O. Castrén and M. Rancan, “Macro-Networks - an application to Euro Area Financial Accounts”, Padova University, 2012. All include different sectors in the same framework.
- 2 C. Upper and A. Worms, “Estimating bilateral exposures in the German interbank market: Is there a danger of contagion?”, *European Economic Review*, Vol. 48, 2004.
- 3 R. N. Mantegna, “Hierarchical structure in financial markets”, *European Physical Journal B*, Vol. 11, 1999.
- 4 Y. V. Hochberg, A. Ljungqvist and Y. Lu, “Whom You Know Matters: Venture Capital Networks and Investment Performance”, *Journal of Finance*, Vol. 62, 2007.
- 5 F. Castiglionesi and N. Navarro, “Optimal Fragile Financial Networks”, Tilburg University, 2007.
- 6 See D. J. Watts and S. H. Strogatz, “Collective dynamics of ‘small-world’ networks”, *Nature*, Vol. 393, 1998.
- 7 This is in contrast to *regular* networks, characterised by a large value for the average path length and a high degree of clustering, and *random* networks, which have a low average shortest path and a small degree of clustering.
- 8 Similar mechanisms could help explain rumours, fears and excessive euphoria spread across professional investors and financial markets.

In addition to the description of the structure of banks' interlinkages as a unit in itself, *measures based at the bank level* (i.e. at the node level) give a wider perspective on system fragilities. In fact, banks' centrality may be understood by reference to three different structural attributes within the network: a bank's *degree*, *between-ness* and *closeness*. Network activity would best be analysed using a degree-based measure, whereas an analysis of a node's control of network activity would benefit from a measure based upon between-ness. A measure based upon closeness would be the best solution when looking at independence or efficiency. These *centrality* measures evaluate importance based on the position of a node in relation to the others, and each covers a different aspect of the centrality/power.⁹ For example, a high *degree* of a node (the number of connections or edges the node has to other nodes) is associated with the node's ability to accentuate the spread of a shock, making the network more *fragile*. By contrast, the network is considered to be more *robust* whenever nodes facilitate more risk-shifting and therefore act as shock absorbers.

The importance of financial actors is measured extensively with such metrics by identifying critical institutions, such as banks too connected to fail, illustrating the effects in the event of a loss or a shock, or identifying nodes of the financial network serving a particularly important role.¹⁰

Application of structural surveillance to cross-holdings of bank securities

One rich source of information illustrating the usefulness of network analysis in macro-prudential work is the network with banks as nodes and the cross-holding of securities as links, here referred to as the *securities network*. As observed from the collateral used for Eurosystem operations, in March 2012 this network had 1,530 bank groups (or nodes) and 13,121 group relationships formed by banks holding securities issued by each other amounting to a total of around €914 billion (see Chart C.1 which groups the banks according to the nationality of the issuer/user).

The present analysis relies on observations which are available on a weekly basis starting in October 2008, i.e. over 174 periods. The number of holding relationships or links of each bank with another bank is 17 on average (simple average) and 69 when using a value-weighted average (the value of securities representing the link). Thus, this network is characterised by low density; it is a very sparse network. Indeed the diameter – the greatest distance between any pair of nodes – comprises only seven nodes and the average path length is 2.51, indicating that typically banks are not “too distant” from each other in this type of relationship. This is a consequence of well-connected nodes being linked to less well-connected ones, as indeed a

Chart C.1 The securities networks as observed via a national grouping



Source: ECB.

Note: The number of banks determines how the national cluster is visualised and while it portrays the centrality of the cluster in the system as a whole, it does not illustrate its relative fragility.

The securities network represents an invisible, important and very large interbank network...

... which is clustered...

9 Centrality metrics are different and thus a node with many links will have a high value in terms of degree but may have a marginal position in the overall structure, while a node with a lower degree value but which is more central can matter more in the overall structure. See L. C. Freeman, “Centrality in Social Networks: I. Conceptual Clarification”, *Social Networks*, Vol. 1, 1979.

10 For example, in G. von Peter, “International banking centres: a network perspective”, *BIS Quarterly Review*, December 2007, centrality measures are used to identify Germany, France, the United Kingdom, Switzerland and the United States as international banking centres.

Table C.1 Metrics at the network level

(Mar. 2012)

Average number of links	69.640
Density	0.005
Average path length	2.510
Cluster coefficient	0.126
Weighed cluster coefficient	0.291
Assortativity	-0.410
Diameter	7.000

Sources: ECB and ECB calculations.

low level of assortativity indicates.¹¹ While the concentration of banks in the network is also low (a low clustering coefficient), the larger weighted coefficient implies strong relationships between the nodes (see Table C.1).

Metrics computed at *bank level* may help to ascertain the type of the securities network and thus its vulnerability. Financial institutions having the largest number of connections play a hub role, and those whose securities are widely held by other counterparties are, of course, particularly relevant in measuring system fragility (see Chart C.2).¹²

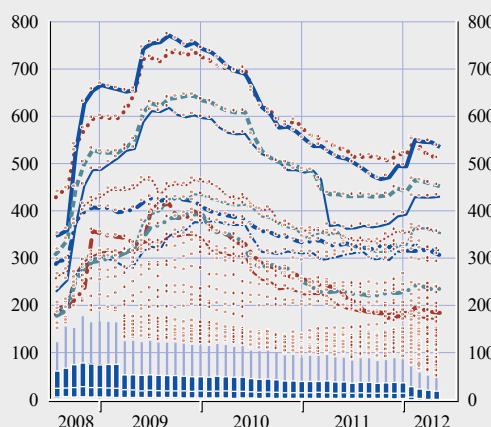
In addition, holding or issuing a bank security distinguishes banks as *users* or *issuers*. Banks are quite specialised: around 13% both issue and hold securities, while the remainder are only issuers (78%) or only users (9%), indicating the hierarchical and “intermediate” nature of financing based on securities-holding (see Chart C.3). The value of the securities held is the *weight* of the link.

Therefore, the *direction* and *size* of the interconnections give further nuance to the analysis. The direction provides information distinguishing between the cause and consequence of potential shocks. The typical *degree* notion of connectedness becomes the dual *in-* and *out-*degrees, clarifying the concepts of users and issuers of securities. Likewise, the number of securities held qualifies the *strength* of the relationship, with larger volumes representing more significant links, and thus enabling the linkages to be *weighed* (see Table C.2).

To illustrate how the analysis is enhanced by the use of both direction and size, it is useful to consider *eigenvector* and *alpha centrality*. Each node is given a starting random positive amount of influence. Each node then splits its influence evenly, dividing it among its outward neighbours and receiving from its inward neighbours in kind, continuing until every institution is giving out as

Chart C.2 ESCB market operation counterparties using each other's uncovered bonds as collateral

(Sep. 2008 – May 2012; monthly distribution of the number of counterparties per issuer)



Sources: ECB and ECB calculations.

Notes: Average monthly number of ESCB market operation counterparties using a given bank issuer's bonds as collateral. For any given month, the figure displays the distribution of such values across bank issuers (box plot capturing 50% of the values and lower and upper whiskers extending the range to 1.5 standard deviations in each direction – values outside this range are marked by a point). The time evolution of these values identifies changes in the “concentration” of the use of these bank bonds as collateral. The ten banks issuing uncovered bank bonds that are most widely used by other counterparties are displayed as coloured lines. While most ECB counterparty bank bonds are held by a few banks (<150), certain banks' securities have been consistently posted as collateral by a very high number of counterparties.

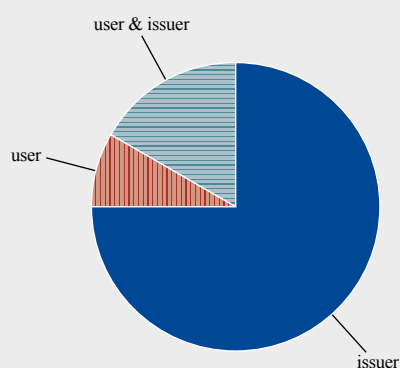
... and where banks have a variety of relationships, some central, others at the periphery...

¹¹ Assortativity describes nodes' preference to attach to others that are similar or different in some way and is often operationalised as a correlation between two nodes. There are several ways to capture such a correlation. The two most prominent measures are the assortativity coefficient and neighbour connectivity.

¹² A number of factors affect the level of securities held by different institutions, such as the introduction of a limit on the use of unsecured bank bonds as collateral.

Chart C.3 The role of banks in the crossholding securities network

(Mar. 2012)



Sources: ECB and ECB calculations.
Note: The pie chart shows the proportion of banks that are users, issuers and both users and issuers relative to the total number of banks.

Table C.2 Metrics at the node level

(Mar. 2012)

	Mean	Std. dev.	Min.	Max.
In-degree	297	1,480	0	22,296
Out-degree	297	1,252	0	18,048
Weighted between-ness	997	7,951	0	164,090
Weighted closeness	113	136	0	1,046
Eigenvector centrality	0.06	0.1	0	1
Alpha centrality	44.52	508	-2,500	3,970
Embeddedness	9	10	1	38
Kleinberg's authority score	0.02	0.09	0	1
Kleinberg's hub score	0.1	0.12	0	1
Power (Bonacich 1987)	0.19	0.98	-3.2	6.05
Page rank	0.0006	0.0029	0.0001	0.0471

Source: ECB calculations.
Note: Std.dev. refers to standard deviation.

much as they are taking in and the system has reached a steady state. Clearly, institutions with larger links, being well connected, have greater influence. The amount of influence each has in this steady state is its eigenvector centrality.

Alpha centrality enhances this process by, first, allowing nodes to have external sources of influence that do not stem from the links themselves, and then trading off external influence against that associated with a connection. Alpha centrality therefore captures an innate centrality of a node that is independent of the number, direction and size of its relationships. A nil value of alpha denotes that only external influence matters, whereas very large values denote that only the innate characteristic of the bank matters. A bank has a positive alpha value for links from or to banks with high scores and a negative value for links from or to banks with low scores.¹³ The large dispersion of alpha centrality around nil supports the notion of much bank diversity, with banks both influencing and being influenced by each other and being connected both as users and issuers (without much innate influence on average).

In addition, banks with a high level of between-ness are more fragile in the event of the failure of other banks, while at the same time they are systemically more important as their difficulties have a bigger impact on the network than banks with a low level of between-ness. *Closeness* also detects systemic importance, quantifying a bank's distance from or to all other banks. While intrinsically denoting fragility, high-closeness banks may also be protected by other big and "healthy" close institutions in the event of the failure of a peripheral bank.

Overall, the standard deviation of centrality measures is very high (see Table C.2). Accordingly, banks have very different positions in the network, with some being very central while others have a negligible role in the system. In particular, the distributions of between-ness and centrality show

... and where the network importance of banks varies over time, capturing the evolution of this fragility

¹³ In addition, Kleinberg's centrality scores do not take into account the weights of links but identify hubs and authorities: important hubs send links to banks that have high authority scores, while a bank is a good authority if it is pointed to by many good hubs. In addition, it can be useful to identify banks linked to very important banks via the Bonacich power centrality (P. Bonacich, "Power and centrality: a family of measures", *The American Journal of Sociology*, Vol. 92, 1987).

that many nodes are almost isolated, with between-ness and closeness scores being essentially negligible.

Importantly, the evolution over time of the distribution of bank-level values can help to illustrate changes in the network's structure. This is the case for between-ness, for instance, whose average across banks can help to ascertain the (average) fragility of the banking system as a whole (see Chart C.4). This measure seems to be sensitive to developments associated with a high impact on confidence, with between-ness measuring a bank's willingness to "become more connected" to other banks (i.e. increased confidence).¹⁴

Overall, measures at the network and node levels confirm that the security network has a centralised structure, with some important banks connected with many other peripheral ones. Moreover, the analysis of the securities network shows that the structure is well integrated across countries, with some banks playing an important role at the European level and others at the domestic level. Single measures alone may not be sufficient to analyse the securities network, as multiple levels of analysis are required to assess banks' network fragility in a complex banking system.

Chart C.4 Centrality of Eurosystem banks as observed in their cross-holdings of securities

(Jan. 2009 – May 2012; average of normalised number of weighted shortest paths)



Sources: ECB and ECB calculations.

Notes: Between-ness is defined as the number of shortest paths from all banks to all others that pass through a particular bank, whereas weighted between-ness uses the amount being held as collateral to weigh the links. The line represents the time evolution of the indexed average of the normalised values. The normalisation accounts for the varying size of the security network through time. Between-ness measures the extent to which a vertex is located "between" other pairs of vertices, and thus is useful as an index of a node's potential to control communication.

INTERCONNECTIONS GAUGED FROM A SIMULATED NETWORK OF BANK LOANS AND DEPOSITS

The introduction of the euro created a large and integrated euro area money market allowing euro area banks to lend to and fund themselves via other euro area banks across national borders. This facilitated financial transactions and trade between euro area countries. However, since the outbreak of the financial crisis in mid-2007, which inter alia led to severe disruptions in the interbank market, particular attention has been paid to the potential counterparty risks incurred by banks via their bilateral interbank exposures.¹⁵

To model how shocks to one (or more) financial entities can have contagious effects throughout the financial system, a dynamic network modelling approach is warranted.¹⁶ However, since data on bank-to-bank bilateral exposures are not generally available, an alternative method is proposed which uses individual banks' aggregate interbank exposures to simulate a wide range of possible interbank networks. Once the interbank interconnectedness structures have been simulated, a dynamic analysis of how and to what extent shocks to different entities propagate throughout the

Given the unavailability of data on banks' bilateral exposures, a simulated network approach is proposed

¹⁴ The three changes illustrated relatively arbitrarily show recent developments with a profound impact – both positive and negative – on the subsequent movement of this measure.

¹⁵ Interbank lending and borrowing constitute a significant part of EU banks' balance sheets (up to 20%).

¹⁶ A broad set of interbank deposit network models for financial stability analysis is presented by E. Nier, J. Yang, T. Yorulmazer and A. Alentorn, "Network models and financial stability", *Journal of Economic Dynamics and Control*, Vol. 31, Issue 6, 2007.

banking system can be conducted. Such an analysis is useful, for example, in a stress-testing context to gauge the impact on specific banks or the banking system as a whole of shocks to one or more banks.

The following paragraphs describe how the interbank structures are simulated before giving an illustrative analysis of an exogenous shock to one or more banks.

Random network model

A sample of 89 European, mostly euro area, banks is used.¹⁷ Notably, only interbank relations between the EU banks are considered, i.e. any cross-border linkages with non-EU banks are ignored.¹⁸ As data on the individual banks' bilateral exposures are not readily available, they are derived from their total interbank placements and deposits. Individual bank data used to parameterise the model are taken from the Bureau van Dijk Bankscope database and banks' financial reports.

An interbank network is randomly generated based on banks' interbank placements and deposits and taking into account the geographical breakdown of banks' activities. Once the distribution of interbank networks has been calibrated, the system can be shocked to assess how specific shocks are transmitted throughout the system and to gauge the implications for the overall resilience of the banking sector. The shock is typically a given bank's default on all of its interbank payments. It then spreads across the banking system, transmitted by the interbank network of the simulated bilateral exposures.

The model consists of three main building blocks: the interbank probability map, the random interbank network generator and the equilibrium interbank payments.

Interbank probability map

Bank-by-bank bilateral interbank exposures are not readily available. Thus, in order to define the interbank linkages, a probability structure (a probability map) is needed. For this purpose, the European Banking Authority (EBA) disclosures on the geographical breakdown of individual banks' activities (here measured by the geographical breakdown of exposures at default) were used. This provides a proxy for the likelihood with which banks lend to and/or borrow from each other given their presence on the same market and client relationship. The probabilities were defined at the country level, i.e. the exposures were aggregated within a country and the fraction of these exposures towards banks in a given country was calculated. These fractions were assumed to be probabilities that a bank in a given country makes an interbank placement to a bank in another (or the same) country. With this aim, banks were first grouped into two sub-categories within countries: banks with a domestic scope of activity and banks with international activities. The classification was based on a ratio calculated as the share of cross-border intra-EU exposures in total exposures.¹⁹

Generating interbank networks

The interbank probability map enables various structures of the interbank network to be studied, even when only aggregated interbank loan/deposit data are available. The basic notion is to reconstruct, using a random generator, the linkages between banks from the reported interbank placements and deposits.²⁰ An iterative procedure to establish a realisation of the network is

An interbank network is generated based on balance sheet data on interbank assets and liabilities...

... and on a probability map defining the likelihood of linkages

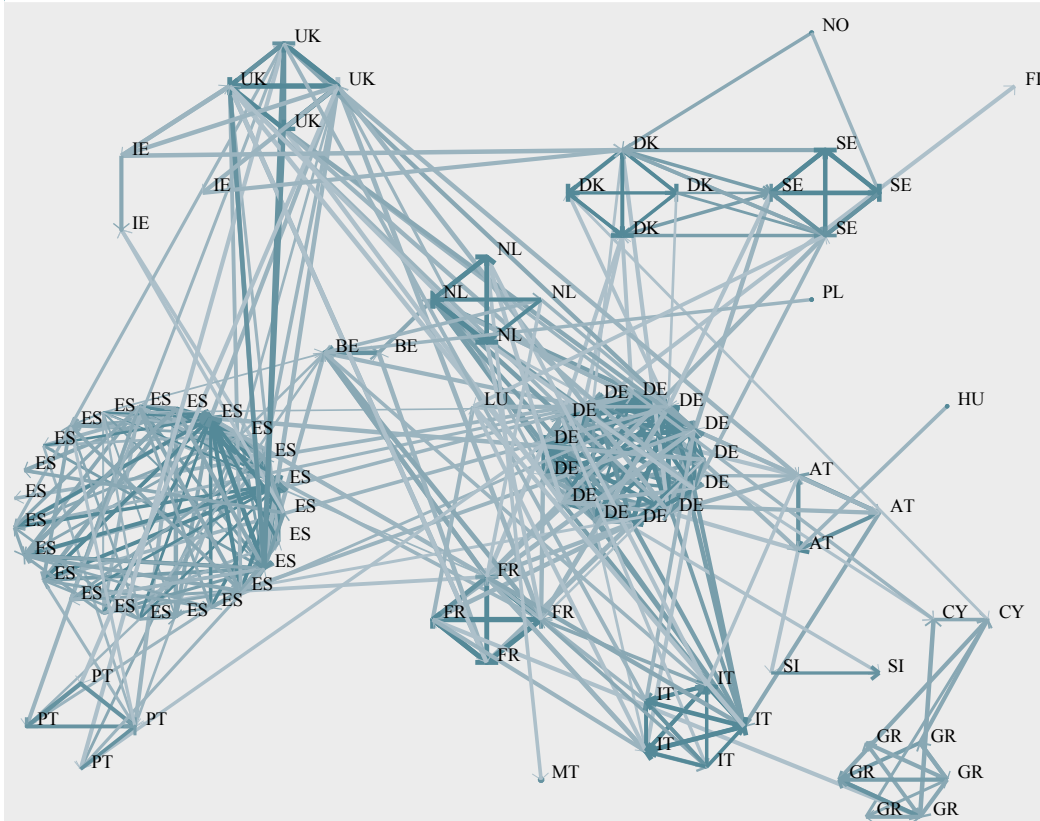
The procedure enables many probable interbank structures to be analysed

¹⁷ The sample covers roughly 70% of total EU bank assets.

¹⁸ This assumption is partly due to a lack of data on extra-EU linkages and partly in order to focus on intra-EU spillover effects. It is obviously a simplification, particularly as regards some of the UK, French and Spanish banks that have large foreign exposures.

¹⁹ Banks with a ratio above the 25% threshold were deemed internationally active banks.

Chart C.5 A simulated interbank network for the EU



Sources: ECB, EBA, Bureau van Dijk Bankscope, banks' financial reports and ECB calculations.

Notes: An arrow from bank A to B indicates an interbank deposit of bank B placed in bank A. The width of an arrow reflects the size of the exposure. The lighter the green colour of an arrow, the lower the probability that the arrow joins a given pair of banks.

applied, whereby a pair of banks is randomly drawn – all pairs have equal probability – and the pair is kept as an edge (link) in the interbank network with a probability given by the probability map. If the drawn link is kept as an interbank exposure, then the random number is generated (from the uniform distribution on $[0,1]$) indicating the percentage of reported interbank liabilities (IL) of the first bank in the pair coming from the second bank in the pair. (The amount is appropriately truncated to account for the reported interbank assets (IA) of the second bank.) If not kept, then the next pair is drawn and accepted with a corresponding probability or not. Ultimately, the stock of interbank liabilities and assets is reduced by the volume of the assigned placement. The procedure is repeated until no more interbank liabilities are left to be assigned as placements from one bank to another. Analysing many different interbank structures instead of just one specific structure (either observed at the reporting date or – if not available – estimated, for example by means of entropic measures) generates the dynamic and unstable interbank structures that are confirmed by many studies.²¹ Chart C.5 illustrates one realisation from the whole distribution of network structures for the EU banking sector generated using the random

20 The idea behind the random interbank network generator is similar to the one introduced by G. Halaj, "Systemic Valuation of Banks – Interbank Equilibrium and Contagion", 2011, to be published in E. Kranakis (ed.), *Advances in Network Analysis and its Applications*, Mathematics in Industry series, Springer Verlag.

21 See, for example, I. van Lelyveld and L. Liedorp, "Interbank Contagion in the Dutch Banking Sector: A Sensitivity Analysis", *International Journal of Central Banking*, Vol. 2, 2006.

network modelling approach. The width of the arrows indicates the size of exposures (logarithmic scale) and the colouring scale (from light to dark green) denotes the probability (inferred from the interbank probability map) that a given bank grants an interbank deposit to the other bank. Most of the connections are between banks from the same country, but the connectivity between the biggest domestic banking systems is also quite high (the German, Spanish and British banking systems in particular).

Equilibrium interbank payments

Once the set of interbank structures has been generated, the impact of shocks to the networks can be analysed by looking at their impact on the equilibrium interbank payment transactions.²² For this purpose, a clearing payments vector is defined, in line with the concept introduced by Eisenberg and Noe.²³ The assessment of the size of the interbank contagion is based on the so-called interbank clearing payments vector defined by the vector p^* solving the following equation (minimum and maximum are entrywise):

$$p^* = \min \left\{ \max \left\{ C - IA + IL + \pi^T \cdot p^*, 0 \right\}, IL \right\},$$

where C is a vector of banks' capital buffers and π^T is a transposed matrix of the relative interbank exposures with π_{ij} entry defined as bank i interbank deposits from bank j divided by the total interbank deposits of bank i .

The expression $C - IA + IL$ can be interpreted as banks' own funding sources adjusted by the net interbank exposures; the ultimate interbank payments are derived as the equilibrium of flows in the interbank network. If p_i^* is equal to IL_i , then bank i returns all its interbank obligations. The contagious default on the interbank deposits is detected if p_i^* is less than IL_i – this means that bank i defaults on its interbank payments. The loss is then proportionately spread among its creditors using the matrix of the relative exposures.

The risk of “fire-sale” losses

If some part of its interbank funding were to evaporate, a bank may need to shed part of its securities portfolio S_i in order to meet its obligations; the less interbank assets it receives back, the higher the liquidation need. This may adversely affect the mark-to-market valuation of the banks' securities portfolios and further depress their capacity to pay back their interbank creditors. Consequently, this mechanism may lead to a spiral effect of fire sales of securities.²⁴ It is assumed that the extent of the devaluation of the securities portfolios is related to the share of the liquidated securities in the total volume of securities held by banks. All in all, there is an implicit assumption that banks do not use eligible securities as collateral to obtain central bank funding in such emergency circumstances; instead they sell outright part of their securities portfolio.

In order to quantify this fire-sale mechanism, an auxiliary measure of the conditional amount of securities sold by bank i given all other banks pay back (p) units of their interbank deposits is introduced. This is the sum of the securities (denoted $SecSold(p)$) that may be sold by banks covering

22 The proneness of the network to contagion may be directly assessed based on the network topology. The most recent concepts are presented in B. M. Tabak, M. Y. Takami, J. M. C. Rocha and D.O. Cajueiro, “Directed Clustering Coefficient as a Measure of Systemic Risk in Complex Banking Networks”, *Working Papers Series*, No 249, Central Bank of Brazil, 2011.

23 See L. Eisenberg and T. Noe, “Systemic risk in financial systems”, *Management Science*, Vol. 47, 2001.

24 On “fire sales”, see, for example, R. Cifuentes, H. S. Shin and G. Ferrucci, “Liquidity Risk and Contagion”, *Journal of the European Economic Association*, Vol. 3, Issue 2-3, 2005, pp. 556-566. A discussion on the strategic foundations of fire sales can be found in D. Diamond and R. Rajan, “Fear of fire sales and the credit freeze”, *NBER Working Paper Series*, No 14925, 2009. An overview of modelling approaches was presented by R. Vishny and A. Schleifer, “Fire Sales in Finance and Macroeconomics”, *Journal of Economic Perspectives*, Vol. 25(1), 2011.

The extent of contagion is measured by equilibrium interbank payments

The spiral effect of “fire sales” of securities may amplify the scale of contagion

The securities sold depress the market value of the existing portfolio, which reduces banks' loss-absorption capacity

the deficiency of resources required to pay back the interbank liabilities. No target leverage ratio is assumed. This could amplify the size of the fire sales. Obviously, a natural cap for that volume is the total volume S_i of a given bank's securities portfolio.

The new equilibrium interbank payments can be computed with a new loss-absorption capacity which is equal to the initial capital level less the devaluation of the securities. It is assumed that the liquidation value of the portfolio of securities is related to the part of the portfolio that may be disposed of (and de facto to the interbank payments vector p) in the following way:

$$S_i(p) = \exp(-\alpha \cdot \text{SecSold}(p)/TS) \cdot S_i,$$

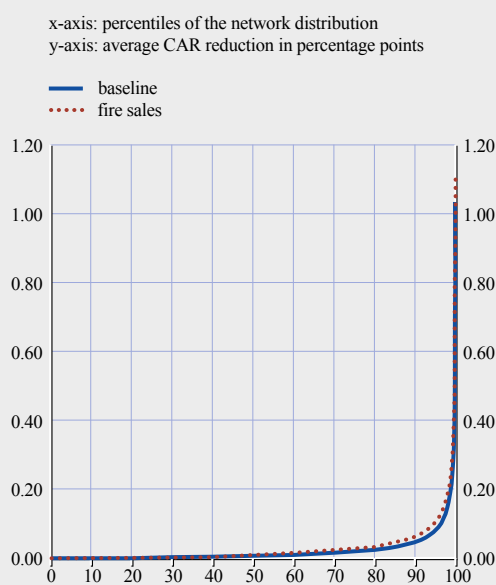
where TS is the aggregate volume of securities in banks' portfolios (a proxy for general securities market depth) and α is the sensitivity parameter. The sensitivity can be gauged by looking at estimates from studies of the impact of bond trading on prices.²⁵ The higher the supply amount of liquidated securities, the lower their expected market value. To simplify, it is implicitly assumed that all the securities are marked to market, so liquidation of part of the securities portfolio affects the valuation of the whole portfolio, which may not be the case for held-to-maturity bonds.

Simulations

The simulation of contagious defaults on interbank debt can be performed following an event-driven concept, where an exogenous shock to the ability of a bank (or a group of banks) to satisfy its creditors affects other institutions' solvency through the linkages in the network. In the following illustration, "bank triggers" of contagion are analysed only within internationally active banks. It is assumed that one of these banks defaults on its interbank deposits. Then 20,000 scenarios of the interbank network are generated and, for each such structure, the clearing payments vector of the interbank system is calculated. In order to illustrate the fire-sale mechanism, the interbank payments equilibrium is simulated with the securities' value sensitivity parameter equal to 0.15.²⁶ Consequently, for the sake of comparability the results are reported in the form of the distribution of the capital adequacy ratio reduction attributable to the interbank (contagion) losses.

As shown in Chart C.6, contagious bank defaults are a tail-risk phenomenon. In 99% of the scenarios of the randomly generated networks, the average reduction of banks' capital adequacy ratios (CAR) does not exceed 0.2 percentage point which, in general, should not depress banks' capital base (the CAR reduction exceeds 1 percentage point in only one out of one

Chart C.6 Aggregate impact on bank solvency of a bank's default on interbank payments



Sources: ECB, EBA, Bureau van Dijk Bankscope, banks' financial reports and ECB calculations.

Contagion is a tail risk, highly non-linear; its impact is very limited in as many as 99% of simulated interbank structures

25 See M. Mitchell, L. H. Pedersen and T. Pulvino, "Slow Moving Capital", *American Economic Review*, Vol. 97, 2007.

26 Following studies by Mitchell et al., *ibid.*, it is calibrated in such a way that a sell-off of 17.5% of banks' securities portfolios leads to a 2.7% discount in the mark-to-market valuation of the portfolios.

thousand realisations). Inclusion of the fire-sale mechanism increases the potential contagious losses but the additional reduction of CAR is rather limited (the average decrease in 1% of the worst-case networks amounts only to 6 basis points). The results are quite homogenous across countries. One natural feature of the interbank losses is their apparent non-linearity since they start to have an adverse effect in the system once linkages of a certain size between certain banks are present in the network. Nevertheless, in most of the cases, the event-driven shock is contained by the diversified interbank connections.

Moreover, at least two important mechanisms may mitigate the risk (and size) of the interbank contagion. First, the Basel II rules on large exposures limit the size of exposure to counterparties and mitigate the risk of contagion. Second, banks actively manage the counterparty trading limits and in many cases they may still have enough time to reduce exposure to an institution perceived as having the potential to get into financial trouble.

CONCLUDING REMARKS

This special feature discusses the use of network analysis based on existing and simulated information in the context of financial stability. Given that only minimal information on financial institutions' interlinkages is in the public domain, the two approaches are a practical means of gaining insight into the interconnection of financial firms. Since the objective of monitoring and assessing such interlinkages can vary depending on the policy question at hand, the approaches highlight broad technical aspects that are fundamental from a macro-prudential perspective for existing data, and present a novel way of testing more dynamic issues on the basis of simulations.

Both the more static analysis of existing financial networks – in this case the securities network – and the dynamic use of a simulated analysis for stress testing constitute new approaches to understanding the fragilities related to activities linking banks with one another. Both exploit information on the microstructure of banking activities to characterise the robustness of the banking sector as a whole to localised operating shocks.

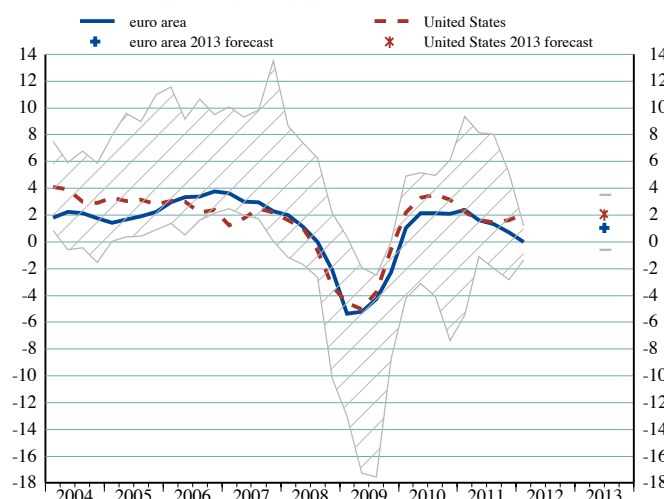
Contagion may be further restricted by large exposure limits and banks' active management of their interbank position

STATISTICAL ANNEX

I MACRO RISKS

S.1.1 Actual and forecast real GDP growth

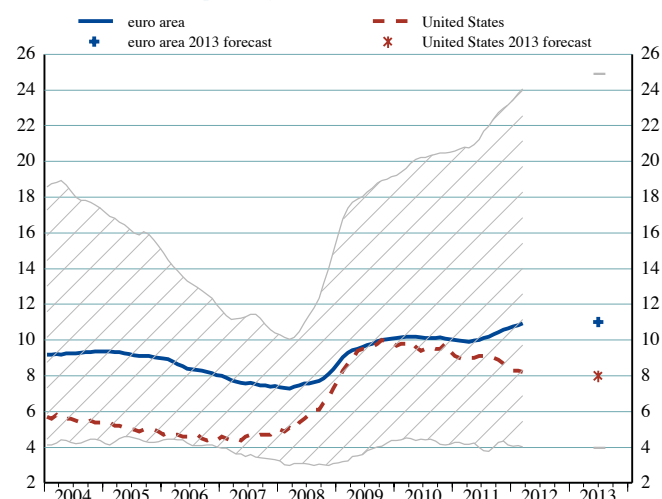
(Q1 2004 - Q1 2012; percentage change per annum)



Sources: Eurostat and European Commission (AMECO, spring 2012 forecast).
Note: The hatched area indicates the minimum-maximum range across euro area countries.

S.1.2 Actual and forecast unemployment rates

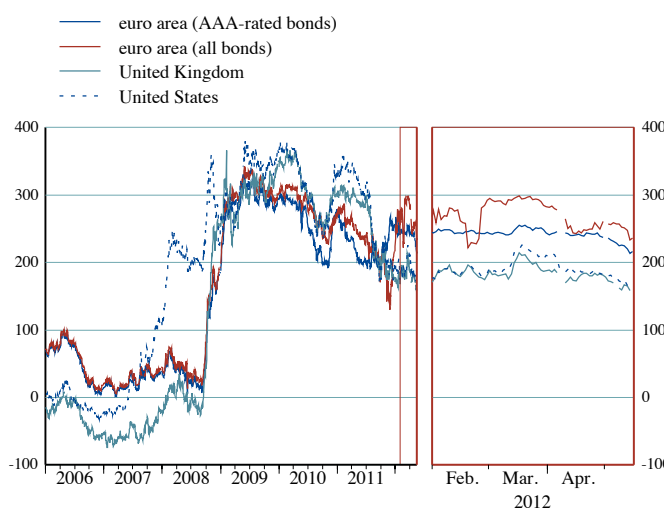
(Jan. 2004 - Mar. 2012; percentage of labour force)



Sources: Eurostat and European Commission (AMECO, spring 2012 forecast).
Note: The hatched area indicates the minimum-maximum range across euro area countries.

S.1.3 Slope of government bond yield curves

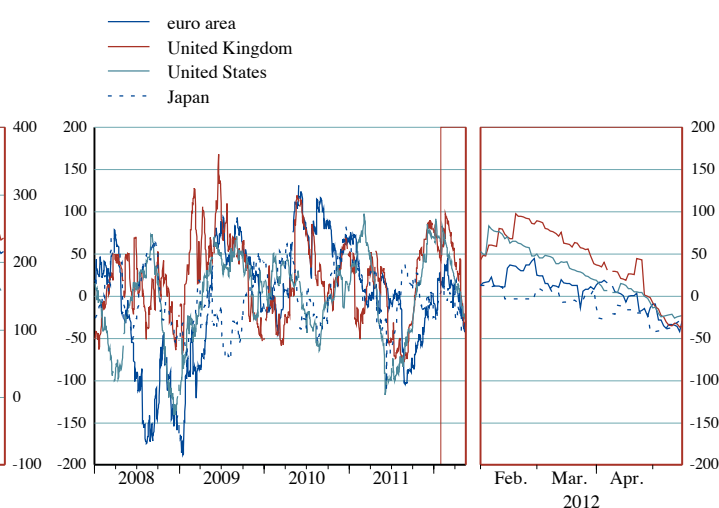
(2 Jan. 2006 - 15 May 2012; basis points)



Sources: BIS and ECB.
Notes: The slope is defined as the difference between ten-year and one-year yields. For the euro area and the United States yield curves are modelled using the Svensson model; a variable roughness penalty model is used to model the yield curve for the United Kingdom.

S.1.4 Citigroup Economic Surprise Index

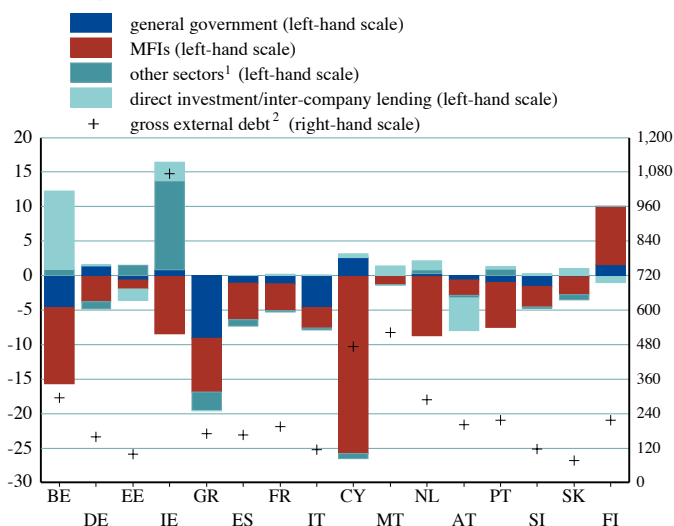
(1 Jan. 2008 - 15 May 2012)



Source: Bloomberg.
Note: A positive reading of the index suggests that economic releases have, on balance, been more positive than consensus expectations.

S.1.5 Quarterly changes in gross external debt

(Q4 2011; percentage of GDP)



Source: ECB.

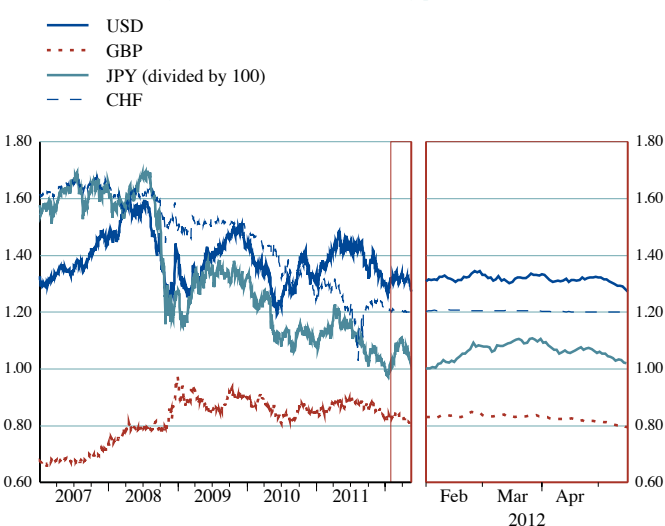
Notes: For Luxembourg quarterly changes were -0.06% for general government, 4.01% for MFIs, 60% for other sectors and 28% for direct investment/inter-company lending. Gross external debt was 3,684% of GDP.

1) Comprise non-MFIs, non-financial corporations and households.

2) Gross external debt as a percentage of GDP.

S.1.6 Exchange rates

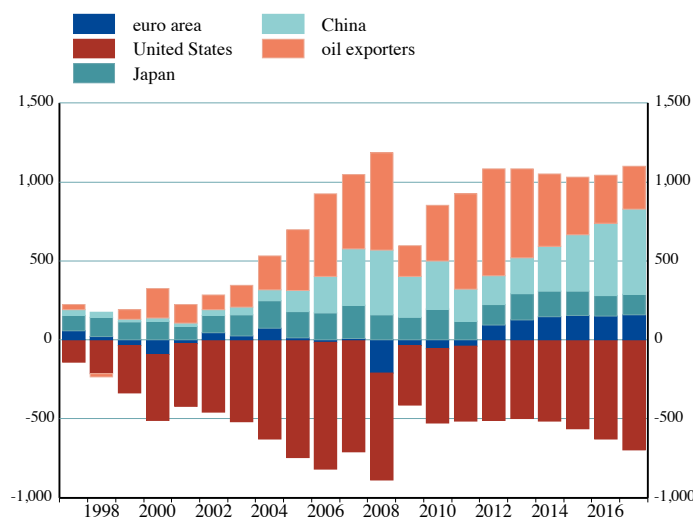
(1 Jan. 2007 - 15 May 2012; units of national currency per euro)



Sources: Bloomberg and ECB calculations.

S.1.7 Current account balances in selected external surplus and deficit economies

(1997 - 2017; USD billions)



Source: IMF World Economic Outlook.

Notes: Oil exporters refers to the OPEC countries, Indonesia, Norway and Russia. Figures for 2012 to 2017 are forecasts.

S.1.8 Current account balances (in absolute amounts) in selected external surplus and deficit economies

(1997 - 2017; percentage of world GDP)

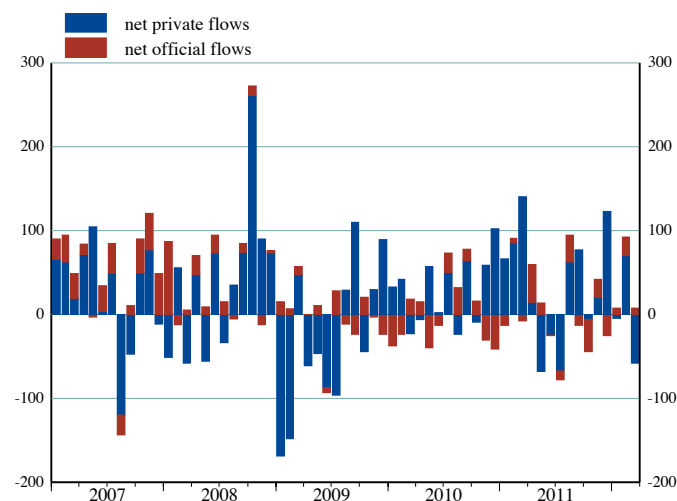


Source: IMF World Economic Outlook.

Notes: All large surplus/deficit economies refers to oil exporters, EU countries, US, China and Japan. Figures for 2012 to 2017 are forecasts.

S.1.9 Monthly net TIC flows into the United States

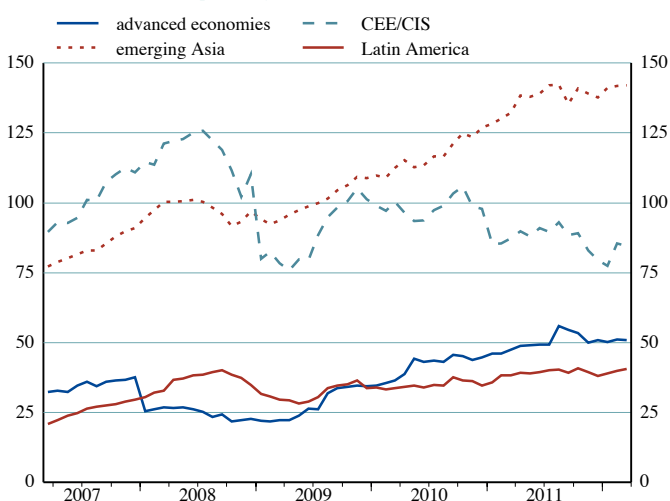
(Jan. 2007 - Mar. 2012; USD billions)



Source: US Treasury International Capital System (TIC).
Note: Net international transactions in long-term domestic and foreign securities between US and non-US residents.

S.1.10 Foreign exchange reserve holdings

(Mar. 2007 - Mar. 2012; percentage of 2009 GDP)

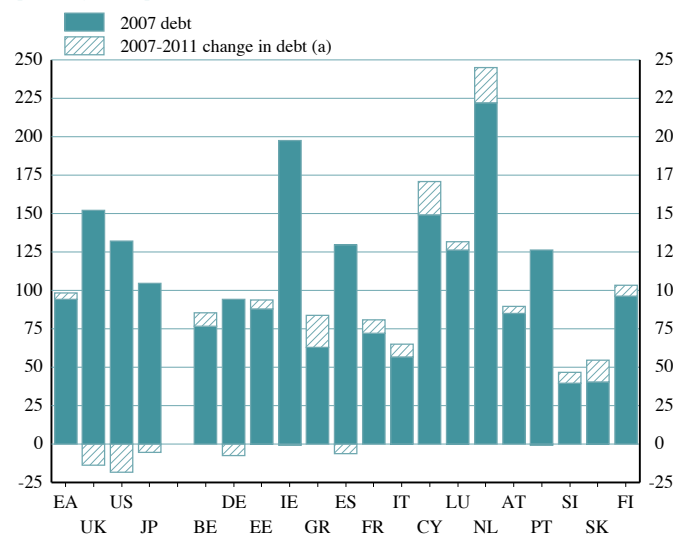


Sources: Bloomberg, IMF World Economic Outlook and IMF International Financial Statistics.
Note: CEE/CIS stands for central and eastern Europe and the Commonwealth of Independent States.

2 CREDIT RISKS

S.2.1 Household debt-to-gross disposable income ratio

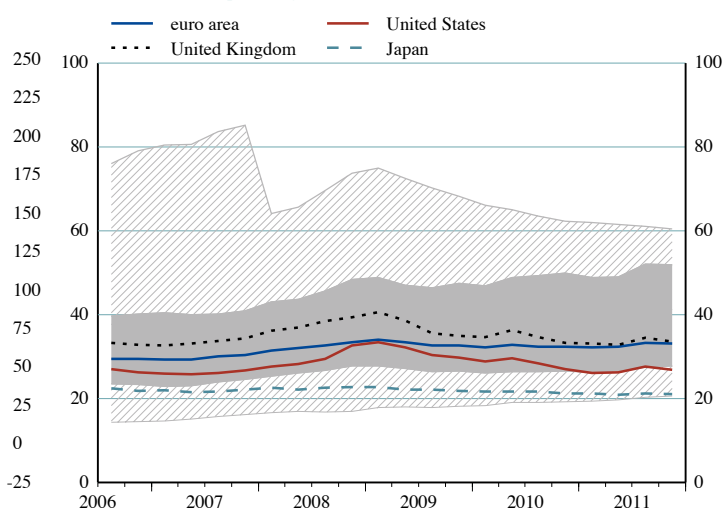
(percentage of disposable income)



Sources: ECB, Eurostat, US Bureau of Economic Analysis and Bank of Japan.
Notes: Gross disposable income adjusted for the change in net equity of households in pension fund reserves.
(a) Data for Estonia, Greece, Cyprus, Japan, Luxembourg, Slovenia and Slovakia refer to 2010. Data for Malta is not available.

S.2.2 Household debt-to-total financial assets ratio

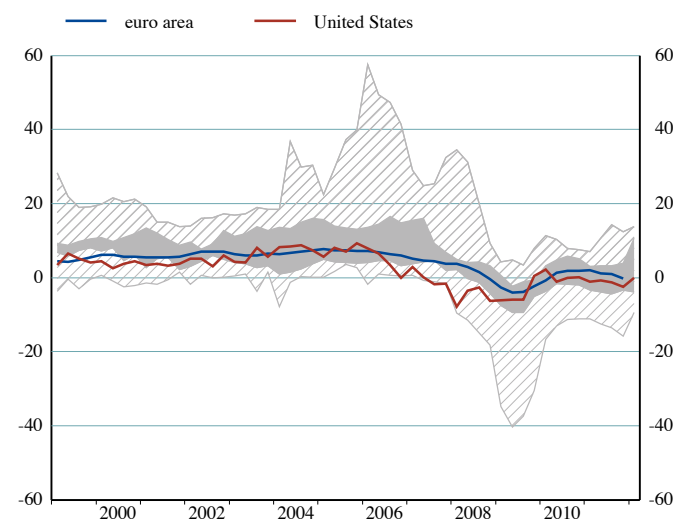
(Q1 2006 - Q4 2011; percentages)



Sources: ECB and ECB calculations, Eurostat, US Bureau of Economic Analysis and Bank of Japan.
Note: The hatched/shaded areas indicate the minimum-maximum and interquartile ranges across euro area countries.

S.2.3 Residential property price changes

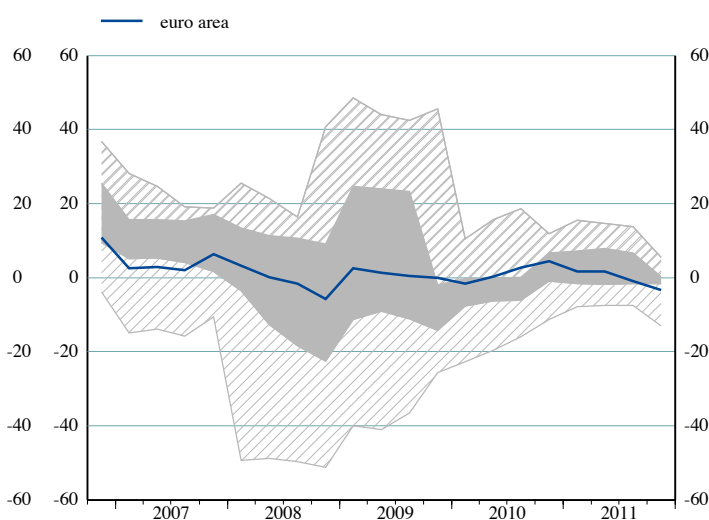
(Q1 1999 - Q1 2012; percentage change per annum)



Sources: National data and ECB calculations.
Notes: The target definition for residential property prices is total dwellings (whole country), but there are national differences. The hatched/shaded areas indicate the minimum-maximum and interquartile ranges across euro area countries, except Italy.

S.2.4 Commercial property price changes

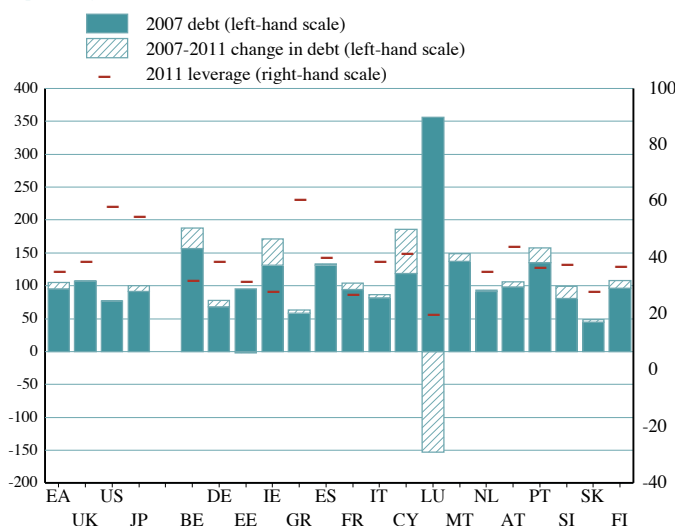
(Q4 2006 - Q4 2011; real capital value; percentage change per annum)



Sources: ECB experimental estimates based on Investment Property Databank data.
Note: The hatched/shaded areas indicate the minimum-maximum and interquartile ranges across euro area countries, except Estonia, Greece, Cyprus, Luxembourg, Malta, Slovenia, Slovakia and Finland.

S.2.5 Corporate debt-to-GDP and leverage ratios

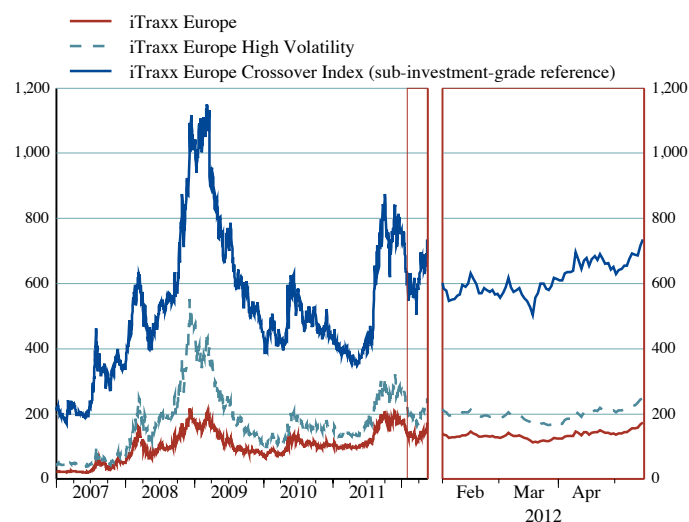
(percentages)



Sources: ECB, Eurostat, US Bureau of Economic Analysis and Bank of Japan.

S.2.6 iTraxx Europe five-year credit default swap indices

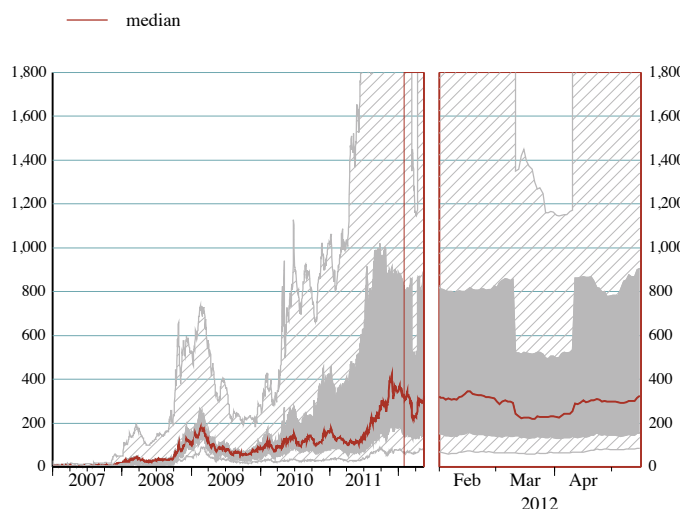
(1 Jan. 2007 - 15 May 2012; basis points)



Source: Bloomberg.

S.2.7 Sovereign credit default swap spreads for euro area countries

(1 Jan. 2007 - 15 May 2012; basis points; senior debt; five-year maturity)

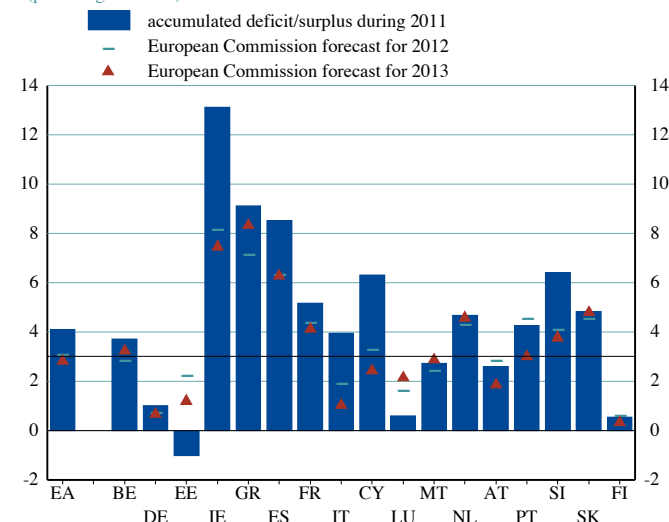


Sources: Thomson Reuters and ECB calculations.

Notes: The hatched/shaded areas indicate the minimum-maximum and interquartile ranges across national sovereign CDS spreads in the euro area. Following the decision by the International Swaps Derivatives Association that a credit event occurred, Greek sovereign CDS were not traded between 9 March 2012 and 11 April 2012. For presentational reasons this chart has been truncated.

S.2.8 General government deficit/surplus (+/-)

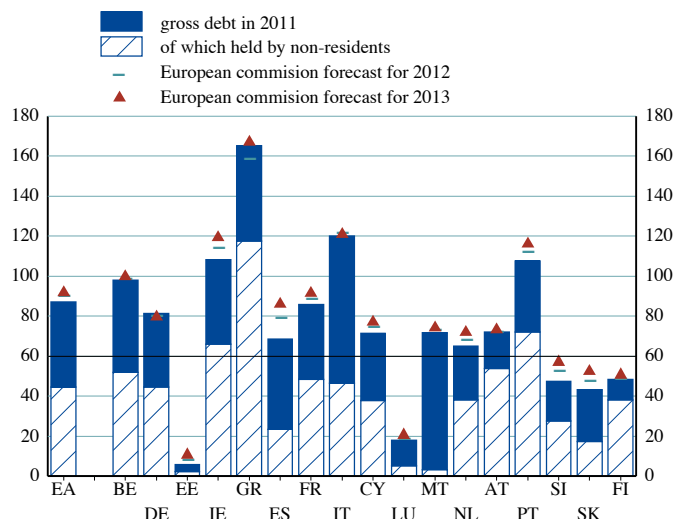
(percentage of GDP)



Sources: National data, European Commission (AMECO, spring 2012 forecast) and ECB calculations.

S.2.9 General government gross debt

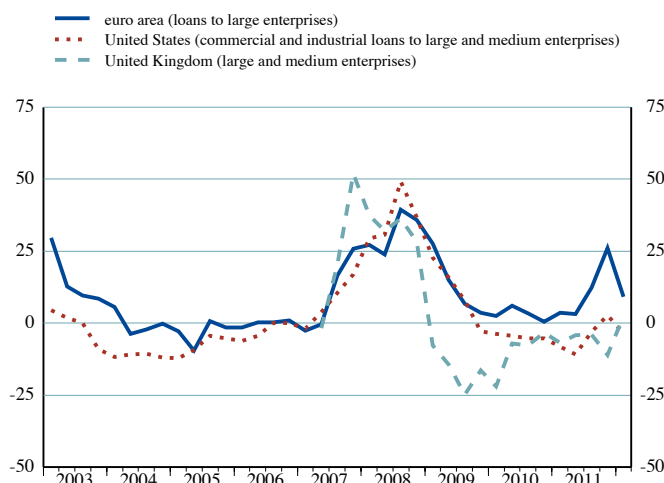
(percentage of GDP)



Sources: National data, European Commission (AMECO, spring 2012 forecast) and ECB calculations.

S.2.10 Changes in credit standards for loans to large enterprises

(Q1 2003 - Q1 2012; percentages)

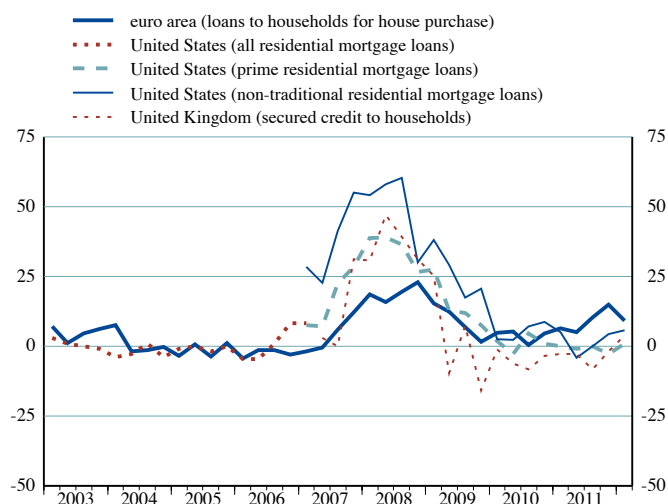


Sources: ECB, Federal Reserve System and Bank of England.

Notes: Weighted net percentage over the past three months of banks contributing to tightening standards. For the United Kingdom, data only start in the second quarter of 2007 and are weighted in addition with the market shares of the participating lenders. The net percentage balances on corporate credit availability in the United Kingdom have been inverted.

S.2.11 Changes in credit standards for residential mortgage loans

(Q1 2003 - Q1 2012; percentages)



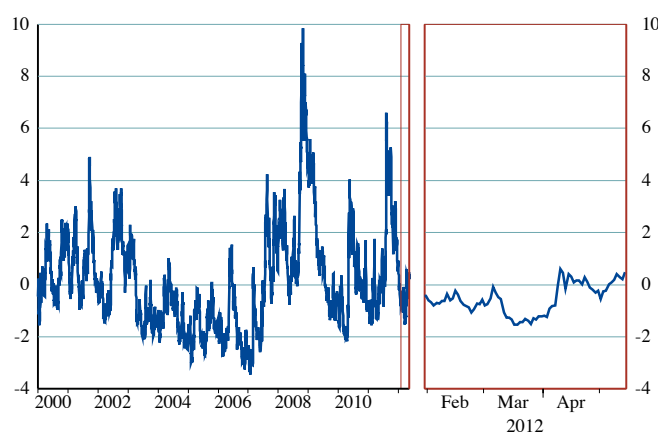
Sources: ECB, Federal Reserve System and Bank of England.

Notes: See the note of Chart S.2.10. The net percentage balances on secured credit availability to households in the United Kingdom have been inverted. For the United States, the series for all residential mortgage loans has been discontinued owing to a split into the prime, non-traditional and sub-prime market segments as from the April 2007 survey.

3 MARKET RISKS

S.3.1 Global risk aversion indicator

(3 Jan. 2000 - 14 May 2012)

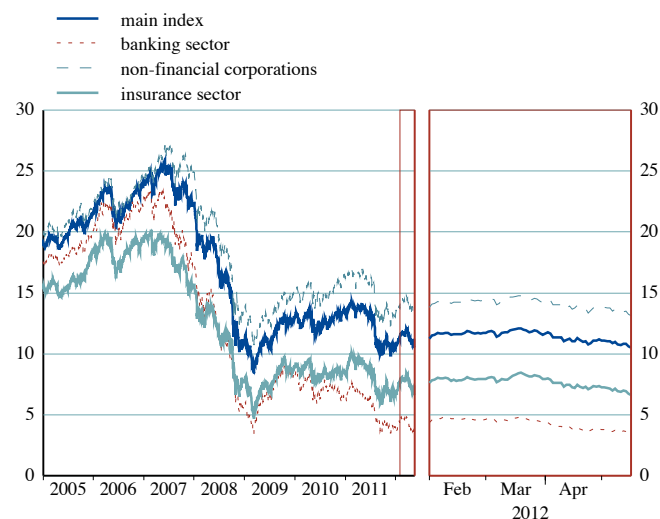


Sources: Bloomberg, Bank of America Merrill Lynch, UBS, Commerzbank and ECB calculations.

Notes: The indicator is constructed as the first principal component of five currently available risk aversion indicators. A rise in the indicator denotes an increase of risk aversion. For further details about the methodology used, see ECB, "Measuring investors' risk appetite", *Financial Stability Review*, June 2010.

S.3.2 Price/earnings ratio for the euro area stock market

(3 Jan. 2005 - 15 May 2012; ten-year trailing earnings)

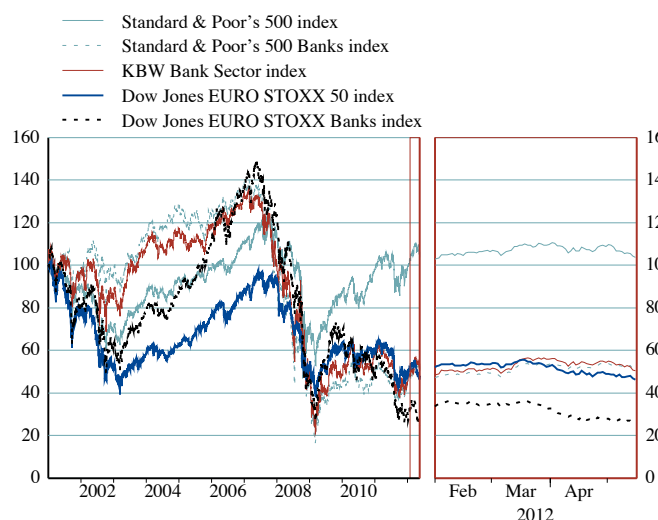


Sources: Thomson Reuters and ECB calculations.

Note: The P/E ratio is based on prevailing stock prices relative to an average of the previous ten years of earnings.

S.3.3 Equity indices

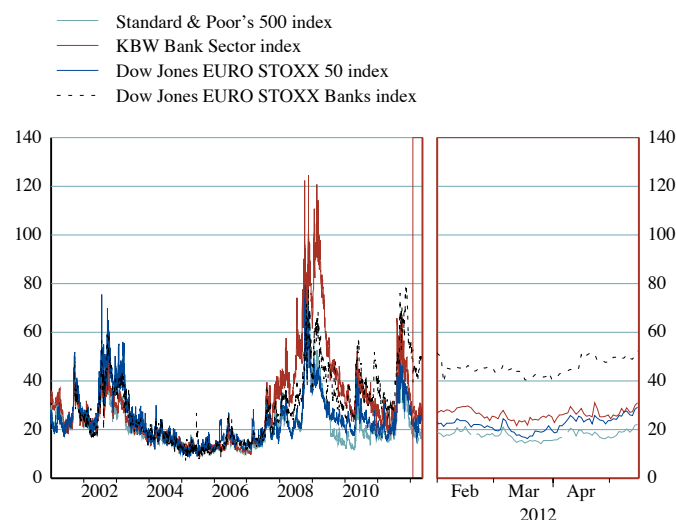
(2 Jan. 2001 - 15 May 2012; index: Jan. 2001 = 100)



Source: Bloomberg.

S.3.4 Implied volatility

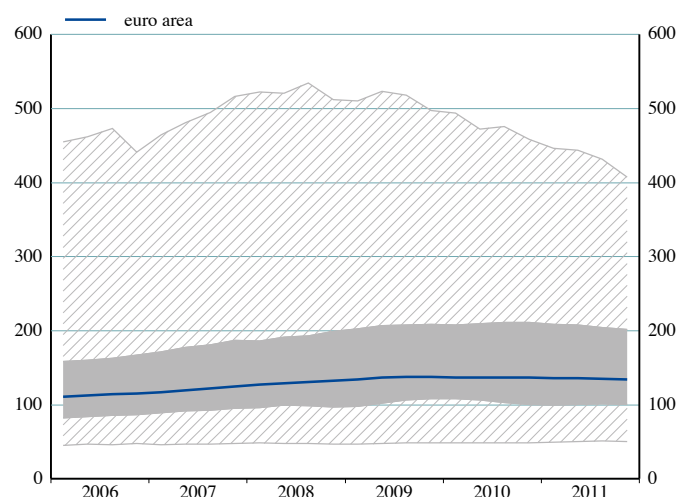
(2 Jan. 2001 - 15 May 2012; percentages)



Source: Bloomberg.

S.3.5 MFI credit to the private sector in the euro area

(Q1 2006 - Q4 2011; as a percentage of GDP)

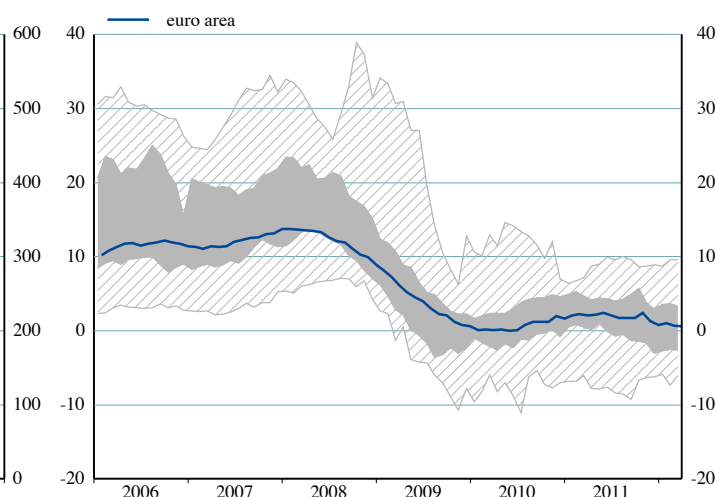


Sources: ECB and ECB calculations.

Notes: MFI sector excluding the Eurosystem. Credit to other residents includes loans and holdings of securities other than shares vis-à-vis non-MFI residents excluding general government; MFI holdings of shares, which are part of the definition of credit used for monetary analysis purposes, are excluded. The chart shows the ratio between notional stocks of credit and GDP at current prices not adjusted for seasonal and calendar effects. The hatched/shaded areas indicate the minimum-maximum and interquartile ranges across euro area countries.

S.3.6 Annual growth of MFI credit to the private sector in the euro area

(Jan. 2006 - Mar. 2012; percentage change per annum)

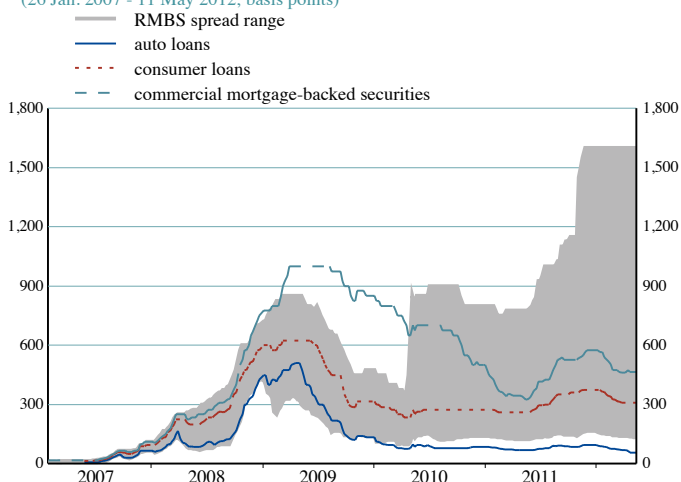


Sources: ECB and ECB calculations.

Notes: MFI sector excluding the Eurosystem. Credit to other residents includes loans and holdings of securities other than shares vis-à-vis non-MFI residents excluding general government; MFI holdings of shares, which are part of the definition of credit used for monetary analysis purposes, are excluded. The hatched/shaded areas indicate the minimum-maximum and interquartile ranges across euro area countries.

S.3.7 Spreads over LIBOR of selected European AAA-rated asset-backed securities

(26 Jan. 2007 - 11 May 2012; basis points)

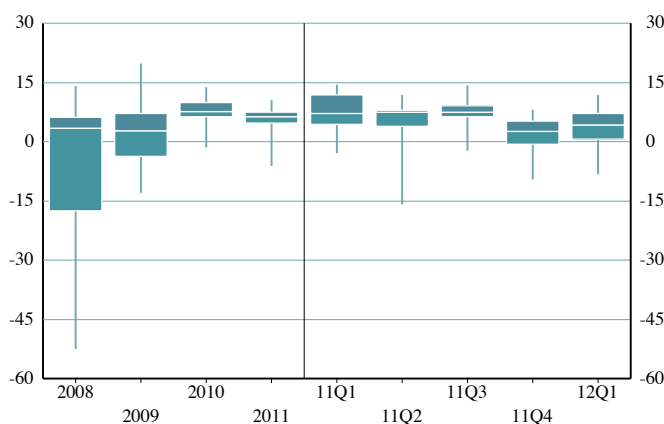


Source: JPMorgan Chase & Co.

Note: In the case of residential mortgage-backed securities (RMBSs), the spread range is the range of available individual country spreads in Greece, Ireland, Spain, Italy, the Netherlands, Portugal and the United Kingdom.

S.3.8 Return on shareholders' equity for global large and complex banking groups

(2008 - Q1 2012; percentages; minimum, maximum and interquartile distribution)

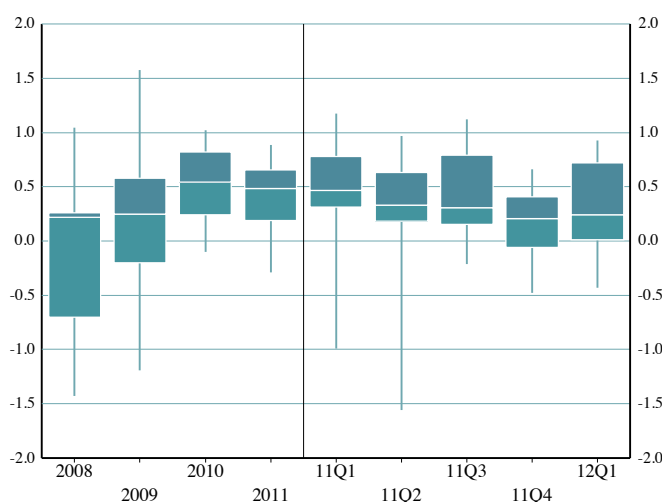


Sources: Individual institutions' reports, Bloomberg and ECB calculations.

Notes: Quarterly figures are annualised. Annual and quarterly data are based on common samples of 13 and 10 global large and complex banking groups respectively.

S.3.9 Return on total assets for global large and complex banking groups

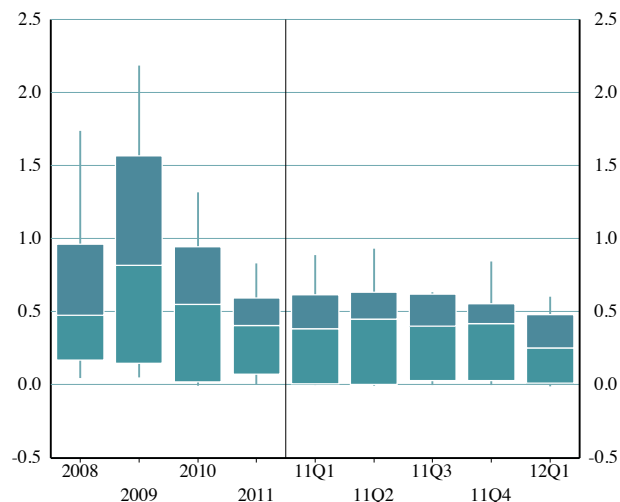
(2008 - 2011; percentages; minimum, maximum and interquartile distribution)



Sources: Individual institutions' reports, Bloomberg, ESCB and ECB calculations.
Notes: Quarterly figures are annualised. Annual and quarterly data are based on common samples of 13 and 11 global large and complex banking groups respectively.

S.3.10 Net loan impairment charges for global large and complex banking groups

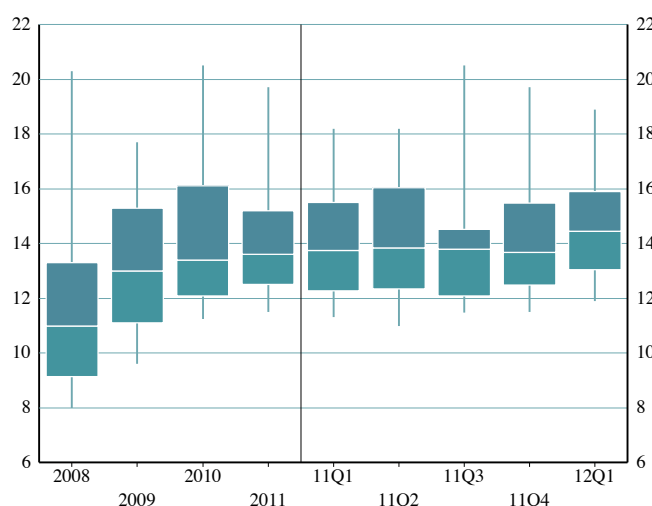
(2008 - 2011; percentage of total assets; minimum, maximum and interquartile distribution)



Sources: Individual institutions' reports, Bloomberg and ECB calculations.
Notes: Annual and quarterly data are based on common samples of ten and eight global large and complex banking groups respectively.

S.3.11 Tier I capital ratio for global large and complex banking groups

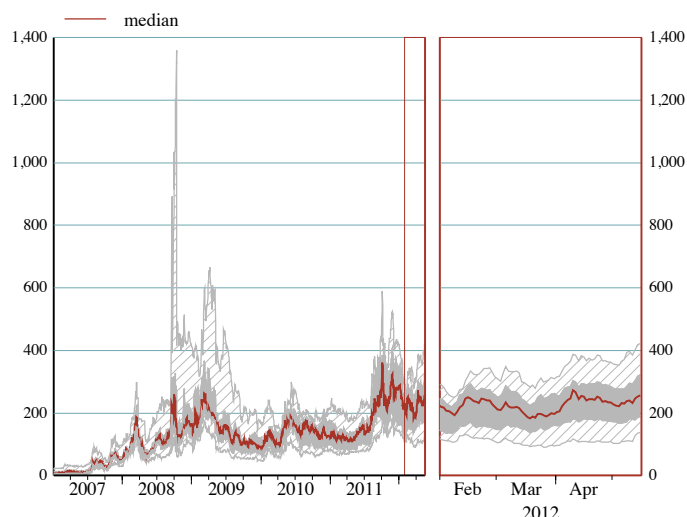
(2008 - 2011; percentages; minimum, maximum and interquartile distribution)



Sources: Individual institutions' reports, Bloomberg, ESCB and ECB calculations.
Notes: Quarterly figures are annualised. Annual and quarterly data are based on common samples of 13 and 12 global large and complex banking groups respectively.

S.3.12 Credit default swap spreads for global large and complex banking groups

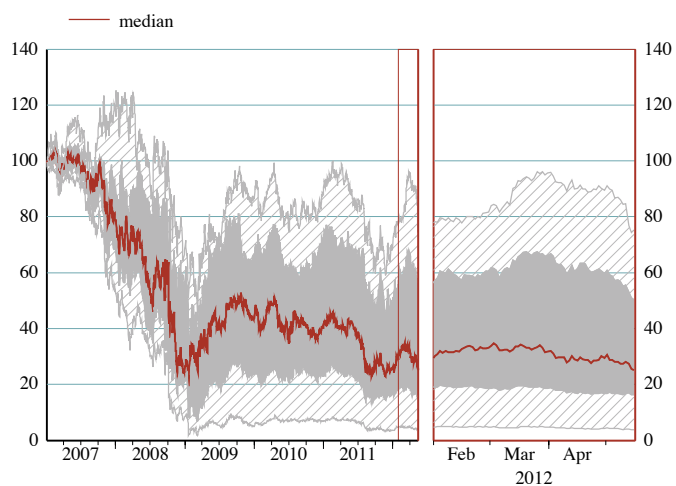
(3 Jan. 2007 - 15 May 2012; basis points; senior debt; five-year maturity)



Sources: Thomson Reuters, Bloomberg and ECB calculations.
Note: The hatched/shaded areas indicate the minimum-maximum and interquartile ranges for the CDS spreads of selected large banks.

S.3.13 Stock performance of global large and complex banking groups

(3 Jan. 2007 - 15 May 2012 ; index: 3 Jan. 2007 = 100)



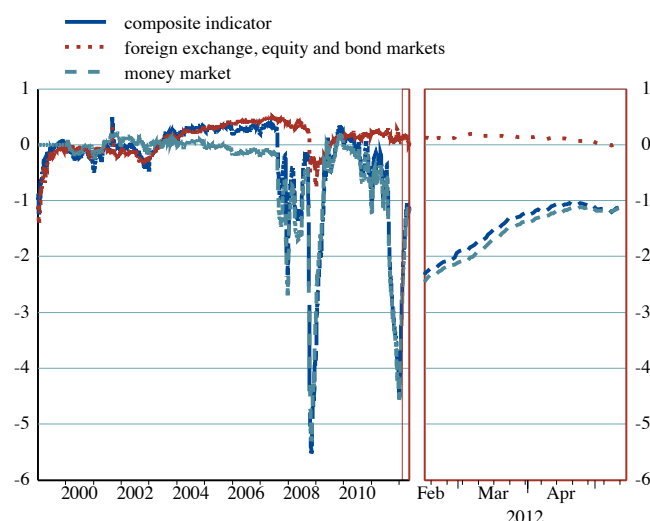
Source: Thomson Reuters, Bloomberg and ECB calculations.

Note: The hatched/shaded areas indicate the minimum-maximum and interquartile ranges for equities of selected large banks.

4 LIQUIDITY AND FUNDING

S.4.1 Financial market liquidity indicator for the euro area and its components

(6 Jan. 1999 - 14 May 2012)

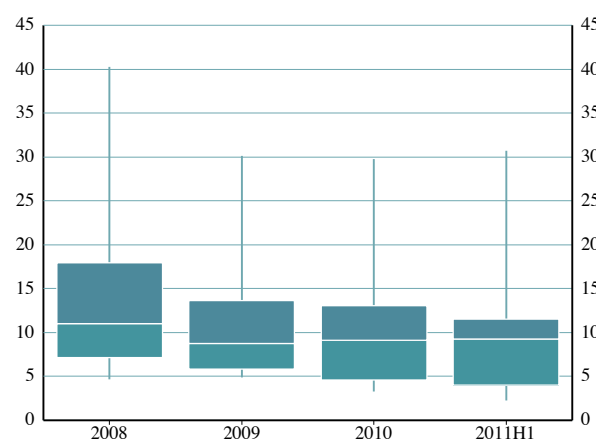


Sources: ECB, Bank of England, Bloomberg, JPMorgan Chase & Co., Moody's KMV and ECB calculations.

Notes: The composite indicator comprises unweighted averages of individual liquidity measures, normalised from 1999 to 2006 for non-money market components and over the period 2000 to 2006 for money market components. The data shown have been exponentially smoothed. For more details, see Box 9 in ECB, *Financial Stability Review*, June 2007.

S.4.2 Liquid assets ratio for euro area domestic banks

(2008 - H1 2011; percentage of total assets; minimum, maximum and interquartile distribution)



Source: ESCB.

Notes: All euro area domestic banks consolidated across borders and sectors, excluding insurers and non-financial corporations. Liquid assets comprise cash and trading assets. The distribution of the ratios is across euro area countries.

S.4.3 Customer loan-to-deposit ratios for euro area large and complex banking groups

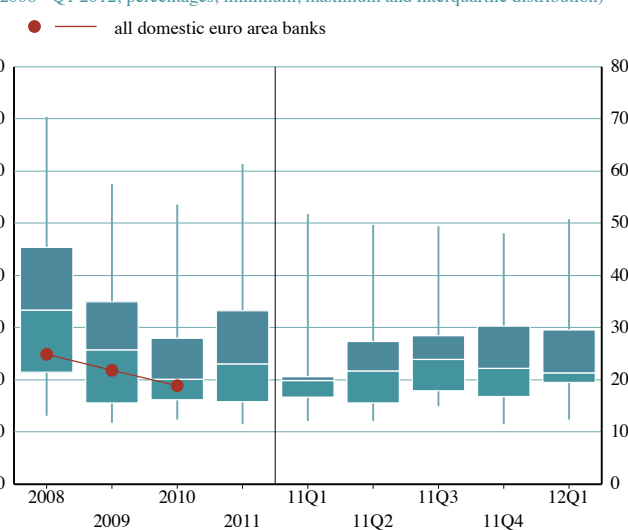
(2008 - Q1 2012; multiple; minimum, maximum and interquartile distribution)



Sources: Individual institutions' reports, Bloomberg, ESCB and ECB calculations.
Notes: Annual and quarterly data are based on common samples of 17 and 12 large and complex banking groups in the euro area respectively. For presentational reasons, a bank with an extreme value was excluded from the sample. Data for all euro area domestic banks are consolidated across borders and sectors, excluding insurers and non-financial corporations.

S.4.4 Ratio of short-term funding to loans for euro area large and complex banking groups

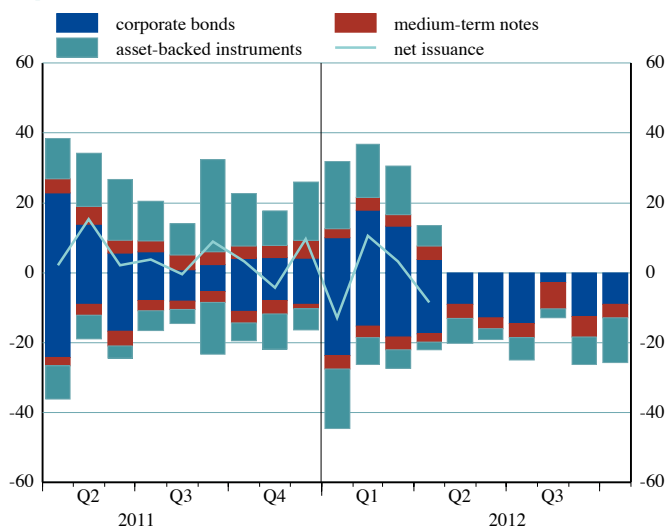
(2008 - Q1 2012; percentages; minimum, maximum and interquartile distribution)



Sources: Individual institutions' reports, Bloomberg, ESCB and ECB calculations.
Notes: Interbank funding is used as the measure of short-term funding. Annual and quarterly data are based on common samples of ten large and complex banking groups in the euro area respectively. Data for all euro area domestic banks are consolidated across borders and sectors, excluding insurers and non-financial corporations.

S.4.5 Issuance profile of long-term debt securities for euro area large and complex banking groups

(Apr. 2011 - Oct. 2012; EUR billions)

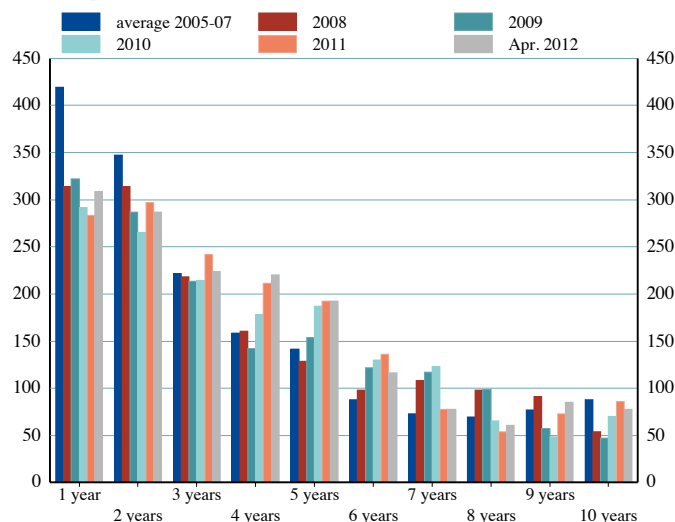


Sources: Dealogic DCM Analytics and ECB calculations.

Notes: Net issuance is the total gross issuance minus scheduled redemptions. Dealogic does not trace instruments following their redemptions and therefore some of these instruments might have been redeemed early. Asset-backed instruments encompass asset-backed and mortgage-backed securities as well as covered bond instruments.

S.4.6 Maturity profile of long-term debt securities for euro area large and complex banking groups

(2005 - Apr. 2012; EUR billions)

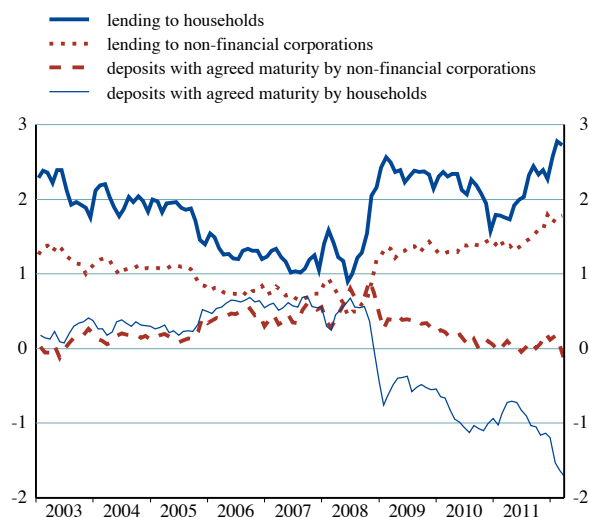


Sources: Dealogic DCM Analytics and ECB calculations.

Notes: Data refer to all amounts outstanding at the end of the corresponding year/month. Long-term debt securities include corporate bonds, medium-term notes, coverage bonds, asset-backed securities and mortgage-backed securities with a minimum maturity of 12 months.

S.4.7 Lending and deposit margins of euro area MFIs

(Jan. 2003 - Mar. 2012; percentage points)

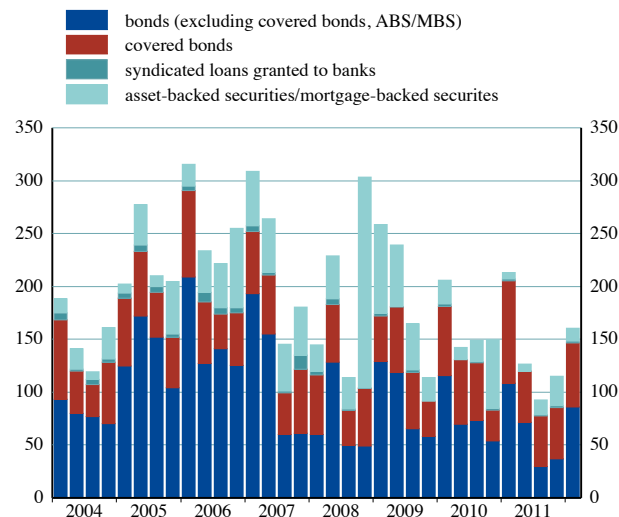


Sources: ECB, Thomson Reuters and ECB calculations.

Notes: Lending margins are calculated as the average of the spreads for the relevant breakdowns of new business loans, using volumes as weights. The individual spreads are the difference between the MFI interest rate for new business loans and the swap rate with a maturity corresponding to the loan category's initial period of rate fixation. For deposits with agreed maturity, margins are calculated as the average of the spreads for the relevant break-downs by maturity, using new business volumes as weights. The individual spreads are the difference between the swap rate and the MFI interest rate on new deposits, where both have corresponding maturities.

S.4.8 Syndicated loans and bonds issuance for euro area banks

(Q1 2004 - Q1 2012; EUR billions)

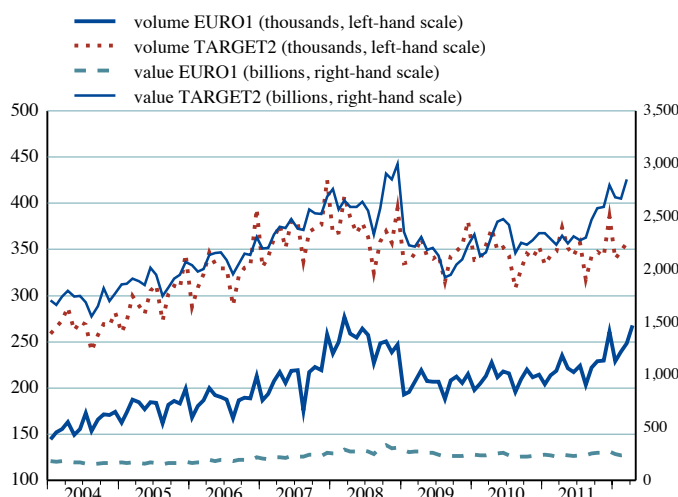


Sources: Dealogic DCM Analytics, Thomson Reuters and ECB calculations.

5 INTERLINKAGES

5.5.1 Payments settled by the large-value payment systems TARGET2 and EURO1

(Jan. 2004 - Apr. 2012; volumes and values)

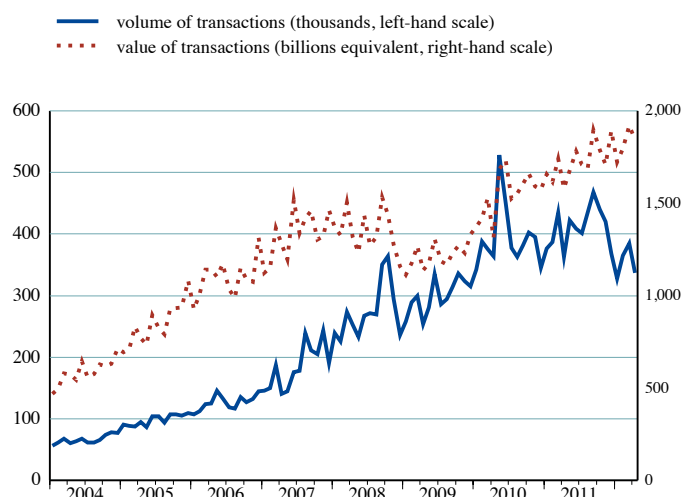


Source: ECB.

Notes: TARGET2 is the real-time gross settlement system for the euro. TARGET2 is operated in central bank money by the Eurosystem. TARGET2 is the biggest large-value payment system (LVPS) operating in euro. The EBA CLEARING Company's EURO1 is a euro-denominated net settlement system owned by private banks, which settles the final positions of its participants via TARGET2 at the end of the day. EURO1 is the second-biggest LVPS operating in euro. TARGET2 data available only up to March 2012.

5.5.2 Volumes and values of foreign exchange trades settled via the Continuous Linked Settlement Bank

(Jan. 2004 - Apr. 2012; volumes and values)

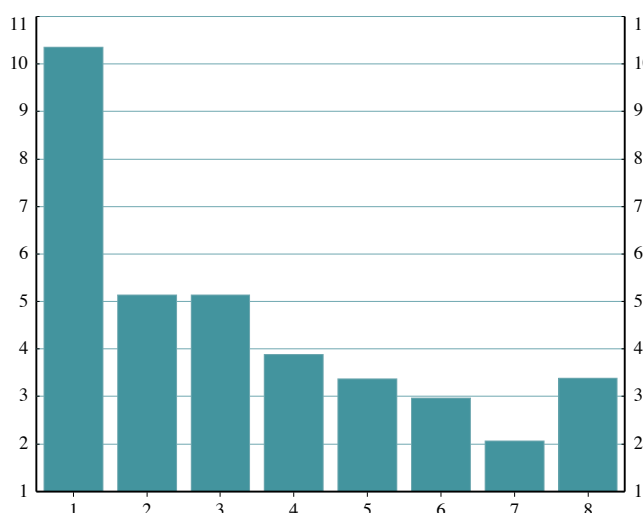


Source: ECB.

Notes: The Continuous Linked Settlement Bank (CLS) is a global financial market infrastructure which offers payment-versus-payment (PvP) settlement of FX transactions. Each PvP transaction consists in two legs. The figures above count only one leg per transaction. CLS transactions are estimated to cover about 60% of the global FX trading activity.

5.5.3 Value of securities held in custody by CSDs and ICSDs

(2010; EUR trillions; settlement in all currencies)

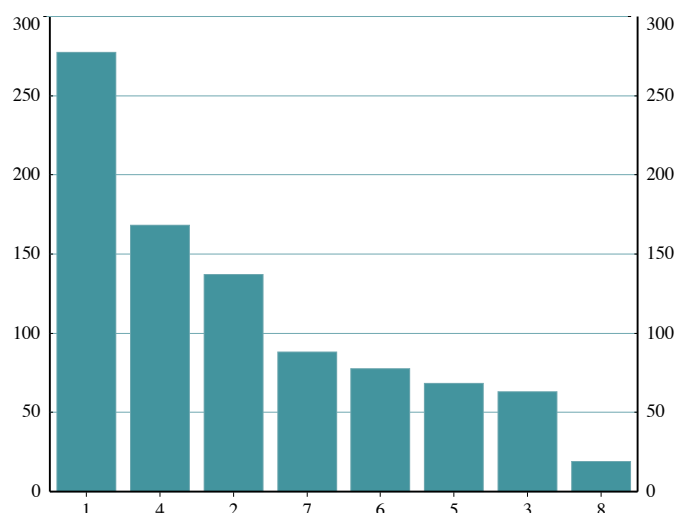


Source: ECB.

Notes: CSDs stands for central securities depositaries and ICSD for international central securities depositaries. 1 - Euroclear Bank (BE); 2 - Euroclear France; 3 - Clearstream Banking Luxembourg-CBL; 4 - CRESTCo (UK); 5 - Clearstream Banking Frankfurt - CBF (DE); 6 - Monte Titoli (IT); 7 - Iberclear (ES); 8 - Remaining 18 central securities depositaries in the euro area.

5.5.4 Value of securities settled by CSDs and ICSDs

(2010; EUR trillions; settlement in all currencies)

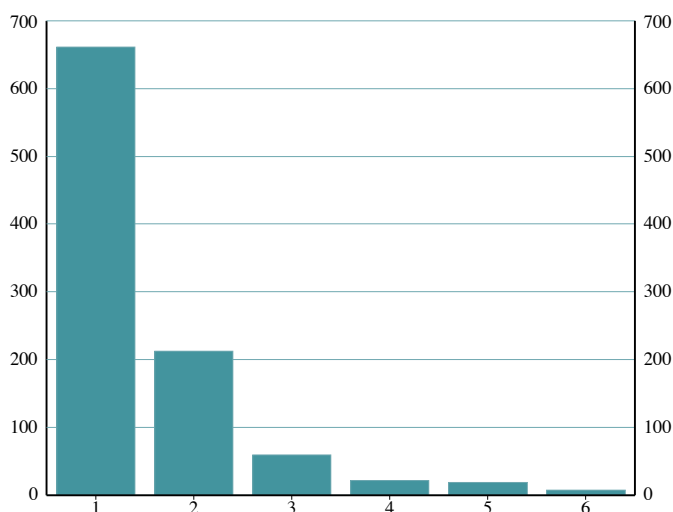


Source: ECB.

Note: See notes of chart 5.5.3.

S.5.5 Value of transactions cleared by central counterparties

(2010; EUR trillions)

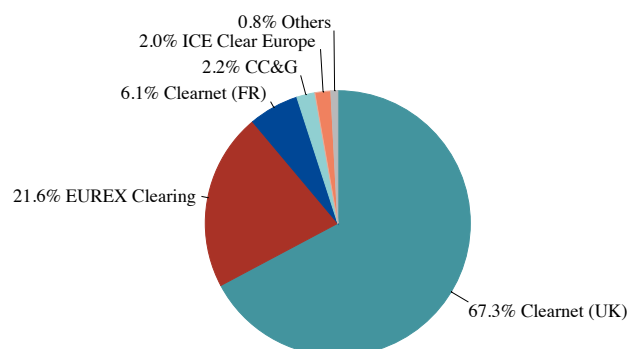


Source: ECB.

Notes: 1 - LCH.Clearnet Ltd (UK, 2009 data); 2 - EUREX Clearing AG (DE); 3 - LCH Clearnet SA (FR); 4 - CC&G (IT); 5 - ICE Clear Europe (UK); 6 - Others. The chart includes outright and repo transactions, financial and commodity derivatives.

S.5.6 Market structure for central counterparty clearing

(2010; percentages)

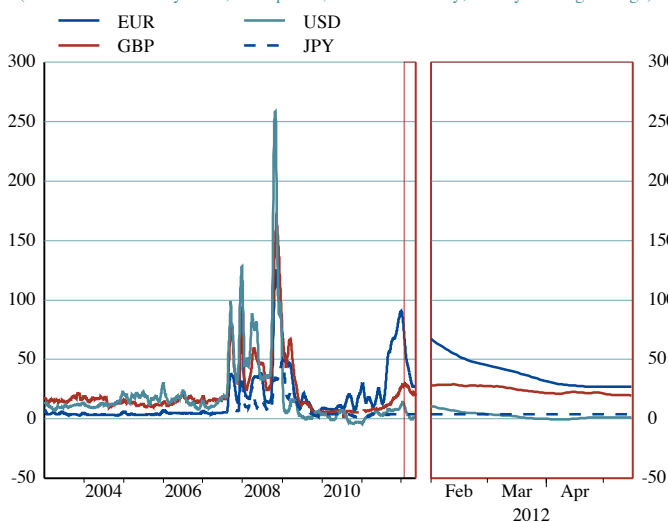


Source: ECB.

Note: The chart includes outright and repo transactions, financial and commodity derivatives.

S.5.7 Spreads between interbank rates and repo rates

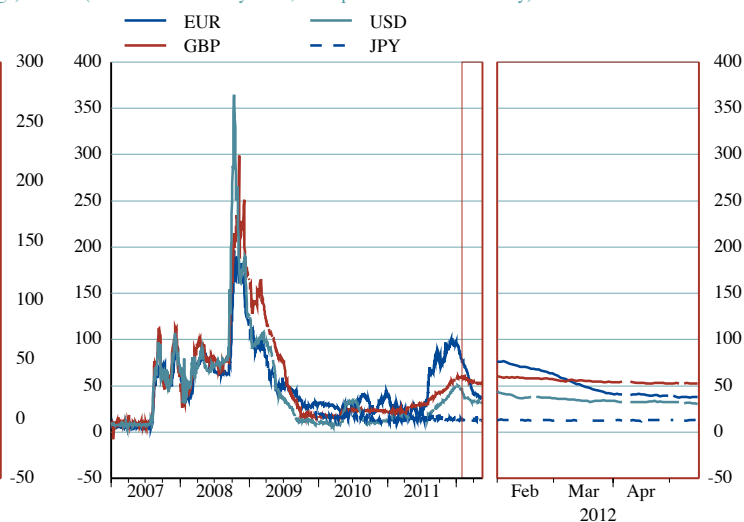
(3 Jan. 2003 - 15 May 2012; basis points; 1-month maturity; 20-day moving average)



Sources: Thomson Reuters, Bloomberg and ECB calculations.

S.5.8 Spreads between interbank rates and OIS rates

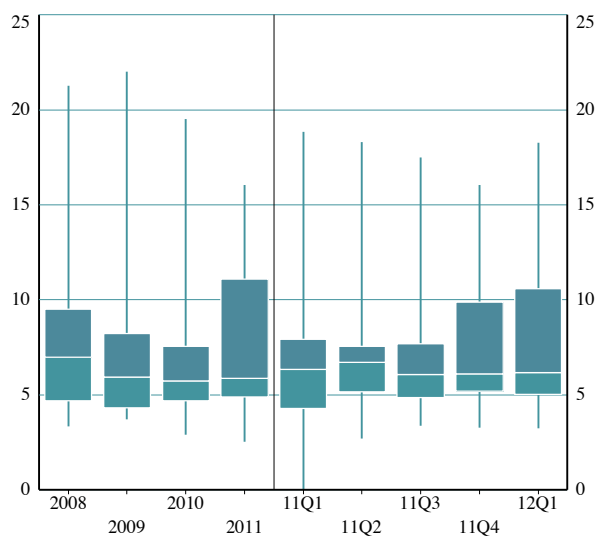
(1 Jan. 2007 - 15 May 2012; basis points; 3-month maturity)



Sources: Thomson Reuters, Bloomberg and ECB calculations.

S.5.9 Interbank borrowing ratio for euro area large and complex banking groups

(2008 - Q1 2012; percentage of total assets; minimum, maximum and interquartile distribution)



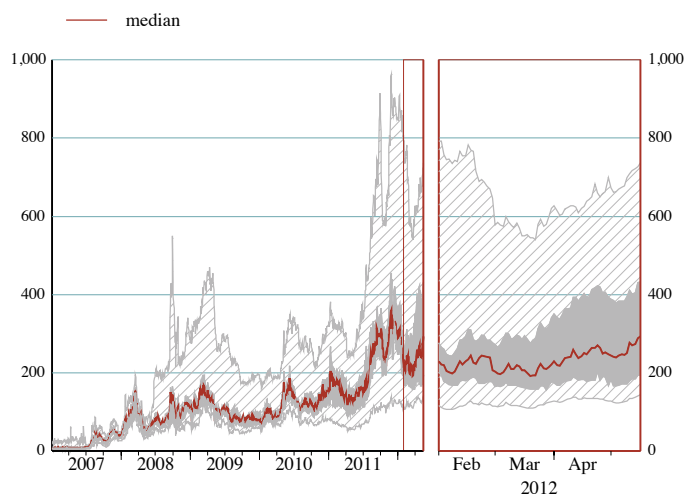
Sources: Individual institutions' reports, Bloomberg and ECB calculations.

Note: Annual and quarterly data are based on common samples of 10 and 11 large and complex banking groups in the euro area respectively.

6 PROFITABILITY AND SOLVENCY OF KEY FINANCIAL INTERMEDIARIES

S.6.1 Credit default swap spreads for euro area large and complex banking groups

(3 Jan. 2007 - 15 May 2012; basis points; senior debt; five-year maturity)

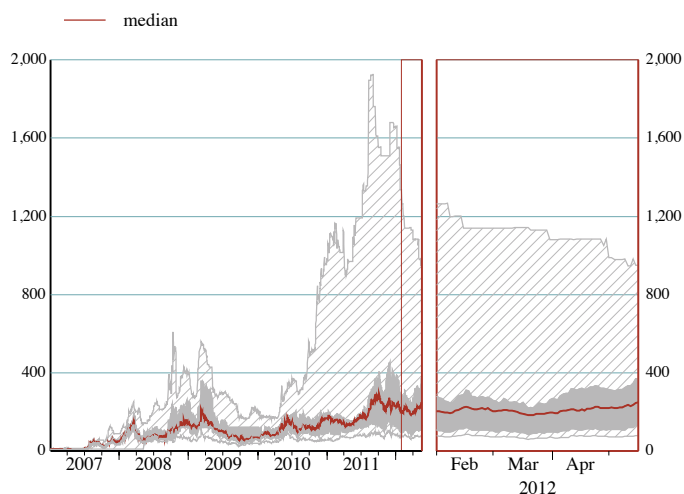


Sources: Thomson Reuters, Bloomberg and ECB calculations.

Note: The hatched/shaded areas indicate the minimum-maximum and interquartile ranges across the CDS spreads of selected large banks.

S.6.2 Credit default swap spreads for a sample of large euro area insurers

(3 Jan. 2007 - 15 May 2012; basis points; senior debt; five-year maturity)

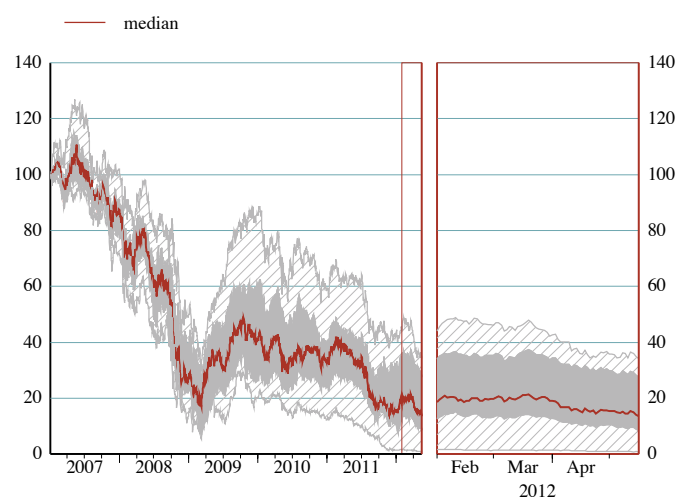


Sources: Thomson Reuters, Bloomberg and ECB calculations.

Note: The hatched/shaded areas indicate the minimum-maximum and interquartile ranges across the CDS spreads of selected large insurers.

S.6.3 Stock performance for euro area large and complex banking groups

(3 Jan. 2007 - 15 May 2012; index: 2 Jan. 2007 = 100)

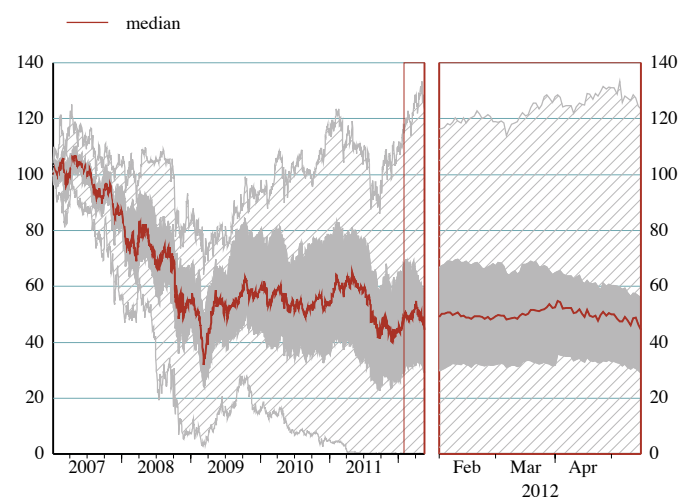


Source: Thomson Reuters, Bloomberg and ECB calculations.

Note: The hatched/shaded areas indicate the minimum-maximum and interquartile ranges across equities of selected large banks.

S.6.4 Stock performance for a sample of large euro area insurers

(3 Jan. 2007 - 15 May 2012; index: 2 Jan. 2007 = 100)

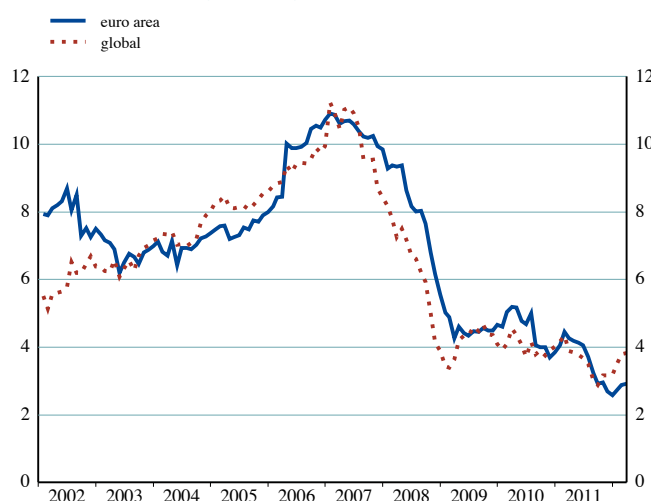


Source: Thomson Reuters, Bloomberg and ECB calculations.

Note: The hatched/shaded areas indicate the minimum-maximum and interquartile ranges across equities of selected large insurers.

S.6.5 Distance to default for large and complex banking groups

(Jan. 2002 – Mar. 2012; weighted average)

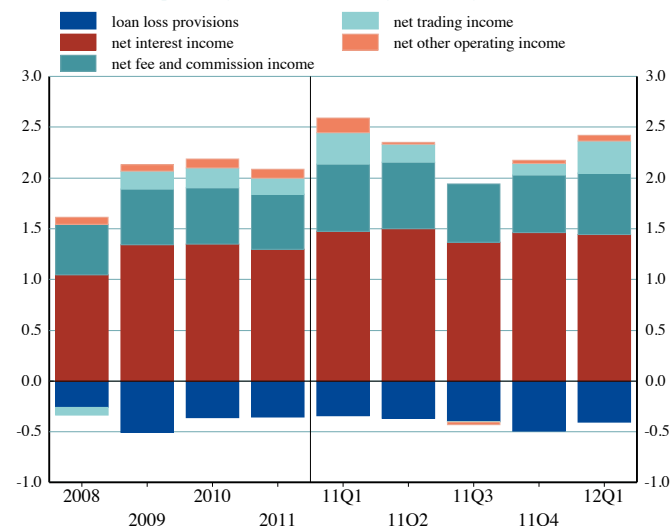


Sources: Moody's KMV and ECB calculations.

Notes: An increase in the distance to default reflects an improving assessment. The weighted average is based on the amounts of non-equity liabilities outstanding.

S.6.6 Breakdown of operating income for euro area large and complex banking groups

(2008 – Q1 2012; percentage of total assets; weighted average)

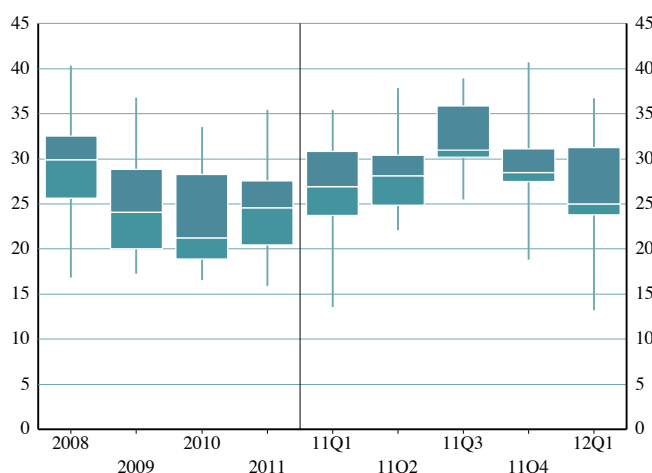


Sources: Individual institutions' reports, Bloomberg and ECB calculations.

Note: Quarterly results are annualised. Quarterly and annual indicators are based on common samples of 15 and 9 large and complex banking groups in the euro area respectively.

S.6.7 Diversification of operating income for euro area large and complex banking groups

(2008 – Q1 2012; individual institutions' standard deviation dispersion)

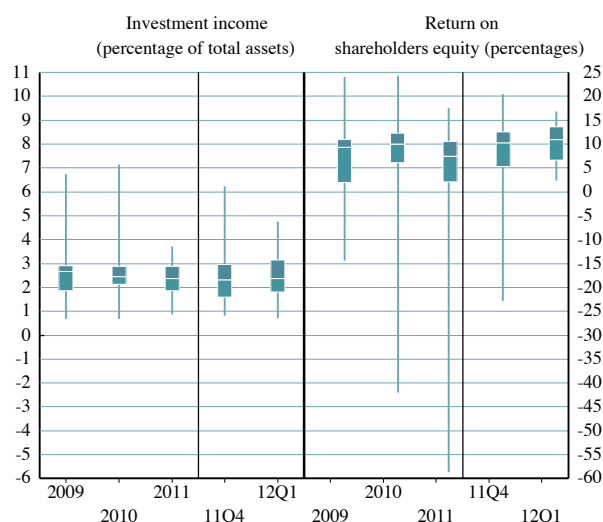


Sources: Individual institutions' reports, Bloomberg, and ECB calculations.

Notes: A value of "0" means full diversification, while a value of "50" means concentration on one source only. Quarterly and annual indicators are based on common samples of 15 and 9 large and complex banking groups in the euro area respectively.

S.6.8 Investment income and return on equity for a sample of large euro area insurers

(2009 – 12Q1; percentages; minimum, maximum and interquartile distribution)

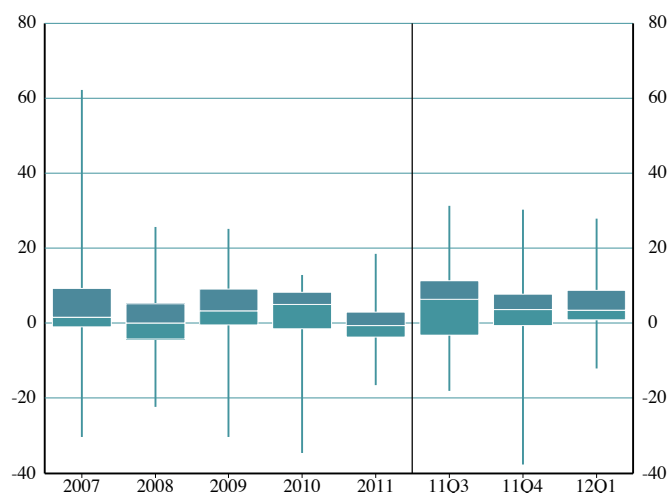


Sources: Bloomberg, individual institutions' reports, and ECB calculations.

Note: Based on available figures for 20 euro area insurers and 4 euro area reinsurers.

S.6.9 Gross-premium-written growth for a sample of large euro area insurers

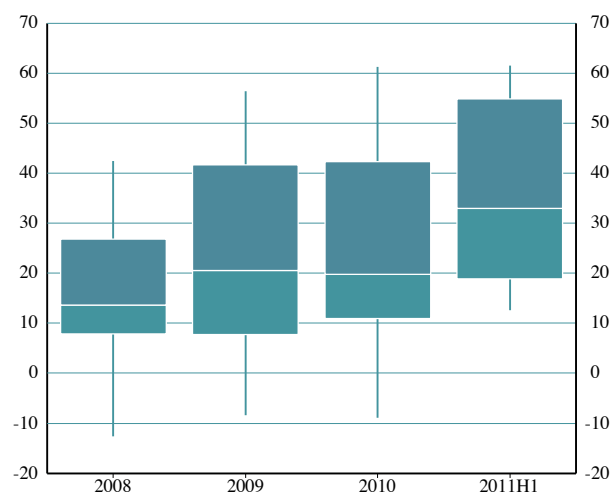
(2007 - Q1 2012; percentage change per annum; minimum, maximum and interquartile distribution)



Sources: Bloomberg, individual institutions' reports and ECB calculations.
Notes: Based on available figures for 20 euro area insurers and 4 euro area reinsurers.

S.6.10 Non-performing loan ratios for euro area domestic banks

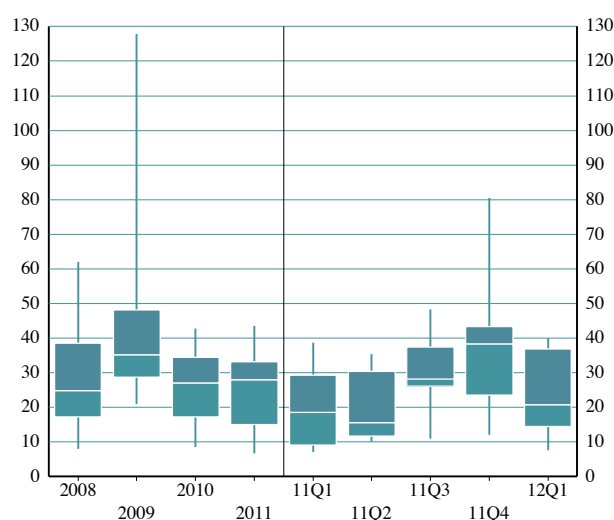
(2008 - H1 2011; percentage of total own funds for solvency purposes; minimum, maximum and interquartile distribution)



Source: ESCB.
Notes: All euro area domestic banks consolidated across borders and sectors, excluding insurers and non-financial corporations. Data refers to net total doubtful and non-performing loans (net provisions). The dispersion of ratios is across euro area countries.

S.6.11 Net loan impairment charges for euro area large and complex banking groups

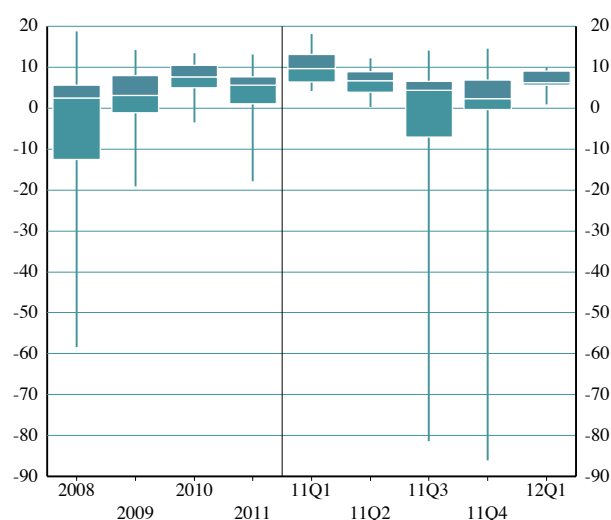
(2008 - Q1 2012; percentage of net interest income; minimum, maximum and interquartile distribution)



Sources: Individual institutions' reports, Bloomberg and ECB calculations.
Notes: Annual and quarterly data are based on common samples of 15 and 9 large and complex banking groups in the euro area respectively. For presentational issues a bank with an extreme value was excluded from the sample.

S.6.12 Return on shareholders' equity for euro area large and complex banking groups

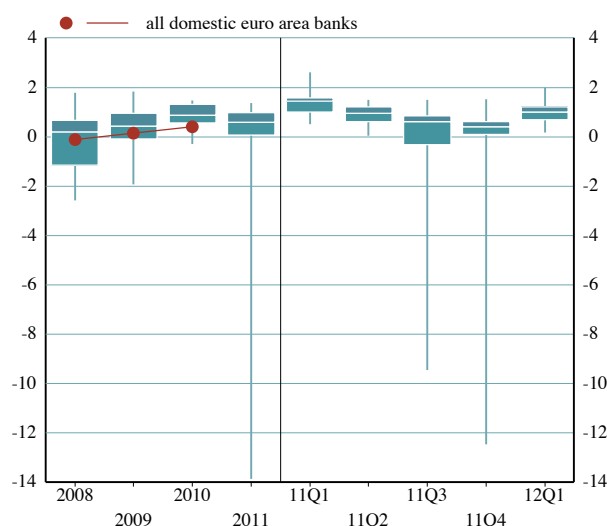
(2008 - Q1 2012; percentages; minimum, maximum and interquartile distribution)



Sources: Individual institutions' reports, Bloomberg and ECB calculations.
Notes: Quarterly figures are annualised. Annual and quarterly data are based on common samples of 17 and 12 large and complex banking groups in the euro area respectively. For presentational issues a bank with an extreme value was excluded from the sample.

S.6.13 Return on risk-weighted assets for euro area large and complex banking groups

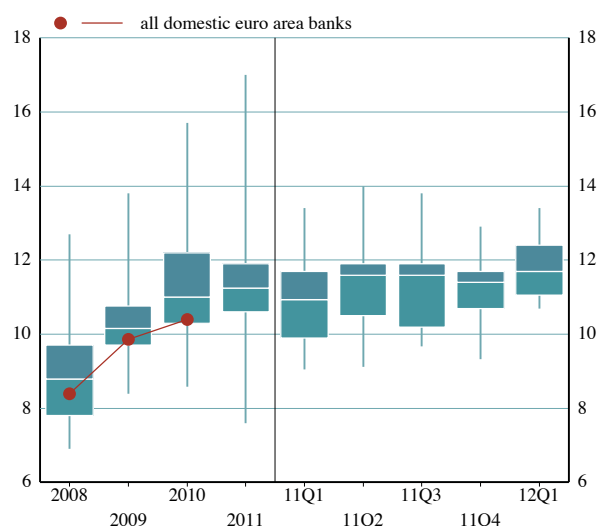
(2008 - Q1 2012; percentages; minimum, maximum and interquartile distribution)



Sources: Individual institutions' reports, Bloomberg, ESCB and ECB calculations.
Notes: Quarterly figures are annualised. Annual and quarterly data are based on common samples of 18 and 13 large and complex banking groups in the euro area respectively. For presentational issues a bank with an extreme value was excluded from the sample. Data for all euro area domestic banks are consolidated across borders and sectors, excluding insurers and non-financial corporations.

S.6.14 Tier I capital ratio for euro area large and complex banking groups

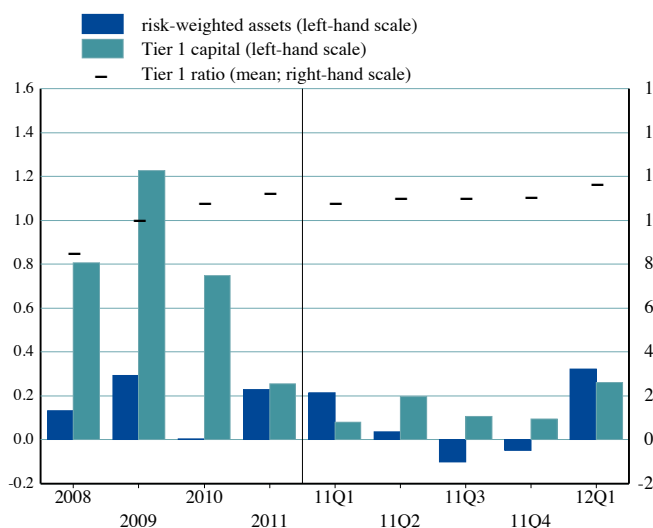
(2008 - Q1 2012; percentages; minimum, maximum and interquartile distribution)



Sources: Individual institutions' reports, Bloomberg, ESCB and ECB calculations.
Notes: Annual and quarterly data are based on common samples of 18 and 13 large and complex banking groups in the euro area respectively. Data for all euro area domestic banks are consolidated across borders and sectors, excluding insurers and non-financial corporations.

S.6.15 Tier I capital ratio components' contribution to ratio changes for euro area large and complex banking groups

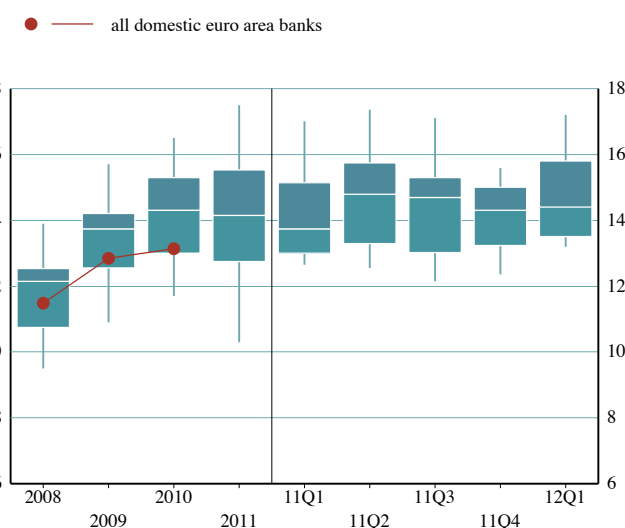
(2008 - Q1 2012; percentages)



Sources: Individual institutions' reports, Bloomberg and ECB calculations.
Notes: Annual and quarterly data are based on common samples of 18 and 13 large and complex banking groups in the euro area respectively.

S.6.16 Total capital ratio for euro area large and complex banking groups

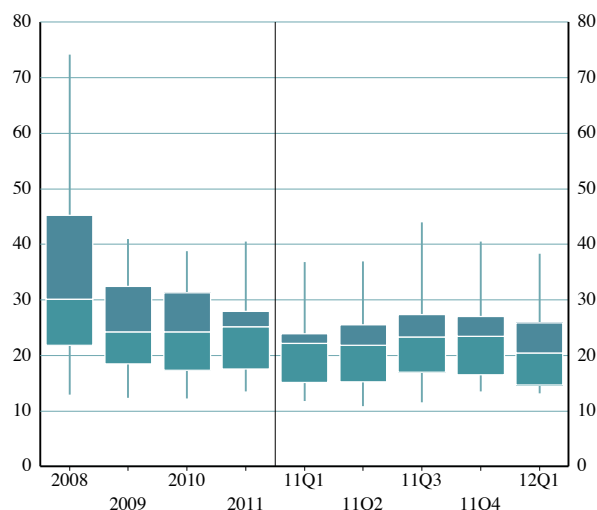
(2008 - Q1 2012; percentages; minimum, maximum and interquartile distribution)



Sources: Individual institutions' reports, Bloomberg, ESCB and ECB calculations.
Notes: Annual and quarterly data are based on common samples of 16 and 11 large and complex banking groups in the euro area respectively. Data for all euro area and non-financial corporations.

S.6.17 Leverage ratio for euro area large and complex banking groups

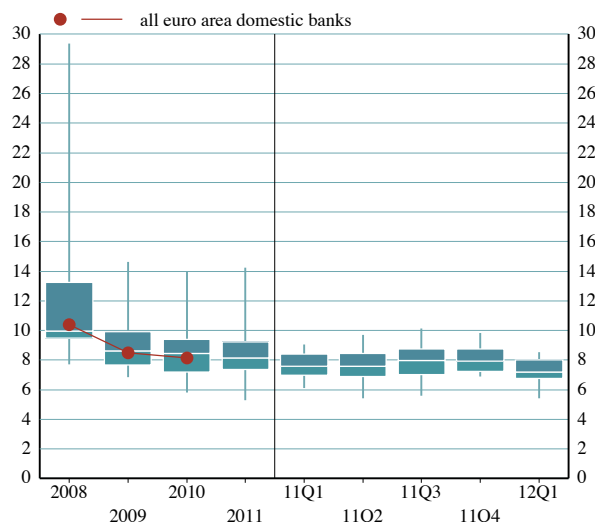
(2008 - Q1 2012; multiple; minimum, maximum and interquartile distribution)



Sources: Individual institutions' reports, Bloomberg and ECB calculations.
Notes: Leverage is defined as the ratio of total assets to shareholders' equity. Annual and quarterly data are based on common samples of 17 and 12 large and complex banking groups in the euro area respectively. For presentational issues a bank with an extreme value was excluded from the sample.

S.6.18 Risk-adjusted leverage ratio for euro area large and complex banking groups

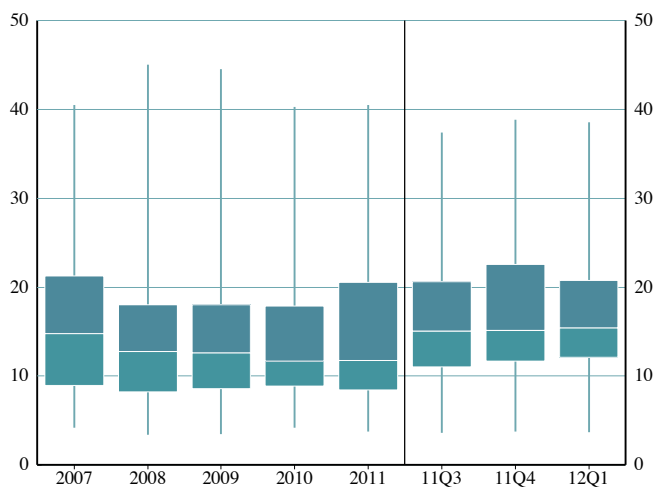
(2008 - Q1 2012; multiple; minimum, maximum and interquartile distribution)



Sources: Individual institutions' reports, Bloomberg, ESCB and ECB calculations.
Notes: Risk-adjusted leverage is defined as the ratio of risk-weighted assets to shareholders' equity. Annual and quarterly data are based on common samples of 17 and 12 large and complex banking groups in the euro area respectively. For presentational issues a bank with an extreme value was excluded from the sample. Data for all euro area domestic banks are consolidated across borders and sectors, excluding insurers and non-financial corporations.

S.6.19 Capital distribution for a sample of large euro area insurers

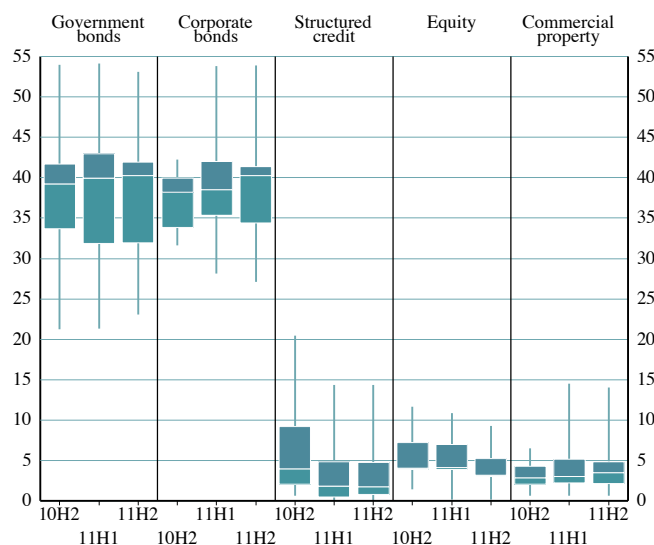
(2007 - Q1 2012; percentage of total assets; minimum, maximum and interquartile distribution)



Sources: Bloomberg, individual institutions' reports and ECB calculations.
Notes: Capital is the sum of borrowings, preferred equity, minority interests, policyholders' equity and total common equity. Data are based on available figures for 20 euro area insurers and 4 euro area reinsurers.

S.6.20 Investment distribution for a sample of large euro area insurers

(H2 2010 - H2 2011; percentage of total investments; minimum, maximum and interquartile distribution)



Sources: Individual institutions' financial reports and ECB calculations.
Notes: Equity exposure data exclude investments in mutual funds. Data are based on available figures for 11 euro area insurers and reinsurers.

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