



EUROPEAN CENTRAL BANK

EUROSYSTEM

# FINANCIAL STABILITY REVIEW

DECEMBER 2009

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## PREFACE

Financial stability can be defined as a condition in which the financial system – comprising of financial intermediaries, markets and market infrastructures – is capable of withstanding shocks and the unravelling of financial imbalances, thereby mitigating the likelihood of disruptions in the financial intermediation process which 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 as inefficiencies in the allocation of financial resources from savers to investors and the mispricing or mismanagement of financial risks. This 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, and contributions from, the Banking Supervision Committee (BSC). The BSC is a forum for cooperation among the national central banks and supervisory authorities of the European Union (EU) and the European Central Bank (ECB).





## I OVERVIEW

The extraordinary remedial actions taken by central banks and governments since late last year have been successful in restoring confidence in, and improving the resilience of, financial systems around the world. Financial system support measures have been addressing the funding challenges of key financial institutions and have bolstered their capital positions. These measures, together with sizeable macroeconomic policy stimulus, set in motion a mutually reinforcing process between financial system conditions and real economic performance, fostering improving business cycle prospects, as well as a fading of systemic risk. An important reason for lowered systemic risk was an abatement of tail risk, thanks primarily to downside protection by governments of financial institutions' balance sheets. Over the past six months, one of the clearest signs of abating tail risk has been a considerable decline in the degree to which the pricing of equity options, on both broad market and financial sector indices, has been factoring-in the possibility of a substantial market correction. At the same time, risk premia across most asset classes have fallen sharply.

A recovery of risk appetite, underpinned by lowered systemic risk, contributed to the remarkable turnaround in financial markets since March 2009 and supported the trading income of large and complex banking groups (LCBGs). Many of these institutions also benefited from a considerable boost to net interest income on account of very steep yield curves. These better financial conditions strengthened the profitability of many LCBGs to such an extent that they were able to absorb considerable write-downs on securities and loans, while still, on average, reporting material improvements in profitability over three consecutive quarters. Some were even able to return the capital they had received from governments, thus exiting from financial support.

Despite the recovery in financial markets and the improved financial performance of euro area LCBGs, there are several grounds for caution in assessing the outlook for financial stability in the euro area. Chief among these is a prospect

of loan write-downs surpassing those already endured by the euro area banking system on exposures to structured credit securities. The drag on profitability that this is likely to imply, in combination with unrelenting market and supervisory authority pressure on LCBGs to keep a lid on the leverage of balance sheets, means that returns on equity are unlikely to durably return to pre-crisis norms. Added to this, financial performances have been very uneven across individual institutions, and there are concerns that the recent recovery in banking sector profitability may prove transient and vulnerable to setbacks. Given the prospects of lower and less certain profitability, parts of the euro area banking system could be rendered vulnerable to plausible adverse disturbances.

The next part of this section reviews the main sources of risk and vulnerability that are present in the macro-financial environment. This is followed by an assessment of the main sources of risk and vulnerability that are specific to the euro area financial system. The section concludes with an overall assessment of the outlook for euro area financial stability.

### SOURCES OF RISK AND VULNERABILITY OUTSIDE THE EURO AREA FINANCIAL SYSTEM

Given that weakness in US housing markets was an important trigger in unleashing the global financial market turmoil of the past two years, prospects for US house prices remain important for the outlook for financial stability in the euro area, especially for the valuation of legacy assets that remain on the balance sheets of euro area financial institutions. In this connection, after tumbling by around 30% from the peak in June 2006, US house prices stopped falling in July 2009, thanks in part to improved affordability. Looking ahead, futures prices indicate that the stabilisation of house prices is likely to be maintained over the next few years. However, there are downside risks to this outlook. While the pace of increase in delinquencies on mortgages and foreclosures has been slowing down, the excess stock of vacant homes remains considerable. This may continue



to exert downward pressure on house prices. In addition, while demand has been spurred by a tax credit for first-time buyers, this financial incentive only has a limited time horizon.

The condition of US corporate sector balance sheets often sets the tone for the pricing of risk in global credit and equity markets. In this respect, cost-cutting has been successful in driving a recovery of the profitability of US non-financial firms, with many reporting better-than-expected earnings over the past six months. While the balance sheets of US firms remain strained, not least because revenue growth has remained weak, an improvement in the credit cycle is in sight, with speculative-grade default rates expected to have reached their peak by late 2009. An area of concern, however, has been the sharp decline in US commercial property prices, which has surpassed that in residential property prices and shows little sign of abating. This raises risks for both banks and other financial institutions that are directly exposed to the commercial property market and investors in US commercial mortgage-backed securities (CMBSs).

Vulnerabilities in the central and eastern European (CEE) countries of the EU have declined since the June 2009 Financial Stability Review (FSR) was finalised, but the economic and financial situation in some of these countries remains sensitive to potential adverse disturbances. The pace of contraction in economic activity has moderated and some countries recorded modest positive growth rates. Lower risk aversion towards the region was reflected in declining government bond yields and credit default swap (CDS) spreads, although they remain above pre-Lehman levels in most CEE Member States of the EU. Moreover, sovereign bond issuance has also recovered in some of these countries, but borrowing conditions remain less favourable than in the period preceding the collapse of Lehman Brothers. The overall exposure of the euro area financial system to the region is not particularly large. However, some euro area-based LCBGs do have sizeable exposures to the region, which makes them vulnerable to, especially, the risk of

larger-than-expected losses on their corporate loan portfolios.

Turning to the euro area non-financial sectors, risks to financial stability stemming from the household sector have increased somewhat further over the past six months. The levelling-off of debt servicing burdens as a result of a continued deceleration of household borrowing and a decline in lending rates has been a positive development. However, household income risks remain, especially in some countries, on account of a macroeconomic environment clouded by downside risks related to rising unemployment. At the same time, there has been a marked slowdown in average house price inflation in the euro area, with prices falling in a number of countries. Considerable downside risks still exist, especially in those countries that saw the strongest rates of house price inflation in the past, in countries where household sector indebtedness is high and in countries where macroeconomic conditions have deteriorated the most. Nevertheless, the low level of interest rates has helped households to service their loans. In this environment, euro area banks can expect considerable write-downs on both residential mortgage and consumer loans. Although mortgage lending represents a larger proportion of euro area bank loan books than consumer loans, the fact that households tend not to default on mortgages so frequently and that this form of borrowing is collateralised means that eventual write-downs on consumer loans will most likely exceed those on mortgages.

For the euro area non-financial corporate sector, overall balance sheet conditions are expected to remain challenging in the near term. This is because firms' financing conditions are not likely to improve significantly in the coming months, while profitability may also remain subdued: weak profits, high leverage and firms' dependence on bank finance are currently the key vulnerabilities facing the corporate sector. Moreover, small and medium-sized enterprises (SMEs) may be confronted with greater funding risks than larger firms because they are more reliant on bank funding, where lending terms

remain tight, and because they are not ordinarily able to finance themselves in capital markets. In this environment, although they are expected to fall, euro area corporate sector default and loan write-off rates may remain elevated for some time to come. This means that euro area banks can expect sizeable additional write-downs on corporate loans over the coming year. At the same time, conditions in euro area commercial property markets have continued to deteriorate over the past six months. Looking ahead, the negative developments in euro area commercial property markets are likely to continue until economic conditions improve and investor appetite for commercial property returns. Against this background, further write-downs on banks' exposures to commercial property lending and investment are likely in the period ahead.

#### SOURCES OF RISK AND VULNERABILITY WITHIN THE EURO AREA FINANCIAL SYSTEM

The functioning of euro area money markets has been improving over the past 12 months. This has been due both to a continuation of the enhanced credit support measures that were introduced by the ECB in October 2008 and to reduced counterparty credit risk as a result of the strengthening of bank balance sheets. Before the finalisation of the last issue of the FSR, the ECB had announced that it would introduce three one-year longer-term refinancing operations (LTROs) and a covered bond purchase programme. The implementation of both of these measures has since commenced, and they have been successful in addressing the funding liquidity risks of banks and alleviating tensions in the euro money market more generally. As a result, spreads between the EURIBOR and corresponding overnight index swaps (OISs) continued to narrow across all maturities, falling to levels not seen since early 2008. Although these spreads were still somewhat above the pre-crisis levels of mid-2007 at the time of writing, forward markets indicated expectations of a consolidation of spreads at the levels prevailing in late November. That said, the redistribution of liquidity within the interbank

money market had not fully normalised by that time. In addition, some banks with weakened balance sheets continued to be dependent on Eurosystem refinancing.

In euro area government bond markets, wide swings in the spreads between the yields of different issuers indicate that government support for financial sectors did not come without a price. As market participants factored in the net present value of the contingent liabilities created by transfers of risk from financial sectors to the fiscal authorities, spreads surged in a number of euro area countries. In some cases, this was amplified by the impact of sizeable fiscal stimulus packages. The subsequent narrowing of spreads, once the prospects for both the financial sector and the real economy had begun to improve, was indicative of the fading away of systemic risk. It reflected a lowering of the market's perception of the value of these contingent liabilities. Nevertheless, the greater correlation of government bond spreads with the fortunes of the financial sector points to an intertwining of financial and fiscal stability prospects as long as government support measures remain in place. Prevailing spreads also indicate remaining concerns about fiscal sustainability in some countries: spreads remain wide in those countries where government indebtedness was already relatively high before the support measures were taken or where the size of troubled financial sectors was large relative to the size of the economy concerned.

Signs of a return to normality within the euro area financial system have been the clearest in private capital markets, across most asset classes. Investor appetite for risk began to return after the first quarter of this year, bringing with it an improvement in market liquidity and a decline in asset price volatility. While the downside protection of financial institutions' balance sheets that was provided by governments was instrumental in removing tail risk, gradually improving macroeconomic news as well as announcements of better than expected earnings, especially by financial institutions, underpinned the turnaround. Against this background, equity

markets rebounded, led by financial stocks. At the same time, historically low levels of money market interest rates induced a hunt for yield among investors, triggering outflows from money market funds into riskier assets, including corporate bonds issued by lower-rated borrowers.

The strength of investor demand for credit instruments was reflected in over-subscription of many primary market corporate bond issues, partly explaining the significant and broad-based tightening of corporate bond spreads despite record issuance. While investment-grade spreads narrowed moderately, there was a substantial compression of sub-investment-grade spreads. Liquidity in the secondary market recovered as well, as reflected in the continued tightening and implementation of the so-called CDS-bond basis – i.e. the difference between CDS premia and the spreads on corresponding cash market bonds. Covered bond spreads benefited from the announcement and implementation of the Eurosystem's covered bond purchase programme, which fostered investor demand against a background of limited secondary market supply. While all of these developments point to an alleviation of earlier market dysfunctions, conditions in the market for asset-backed securities (ABSs) – where there have been almost no public placements and where spreads remain at elevated levels – indicate that investors discriminated among financial products and that the functioning of the markets for some credit instruments continues to be impaired. This is particularly true of the market for CMBSs where the underlying fundamentals remain very weak.

A major beneficiary of the turnaround in financial markets has been the hedge fund industry. After enduring broad-based losses across most investment strategies in 2008, the strength of investment returns in the first ten months of 2009 meant that a substantial proportion of the losses suffered by the sector in 2008 were recouped. Thanks to this, funding liquidity pressures on hedge funds have been abating, and the risk of forced asset sales has been easing, contributing to the stability of

financial markets. Nonetheless, the size and market presence of the hedge fund sector has been reduced. Large investment losses, sizeable redemptions by investors, liquidations and prime broker pressure on funds to deleverage all contributed to lowering the trading volumes of hedge funds in 2008. While some reversal has been taking place as the sectors' fortunes have improved, the influence of hedge funds in financial markets, especially on market liquidity, remains curtailed. That said, the counterparty credit risk faced by banks dealing with hedge funds has moderated.

The buoyancy of financial markets also provided a boost to the financial performances of euro area LCBGs, especially those with sizeable investment banking franchises, in the second and third quarters of 2009. This was most evident in a recovery of the net trading incomes of these institutions following the dismal performances of 2008. However, by far the greatest contributor to LCBG profitability during the period was net interest income: in the second quarter of 2009, the median ratio of net interest income to total assets among euro area LCBGs reached its highest level in the past five years. With overall monthly private sector loan growth rates oscillating close to zero, the strength of net interest income was entirely attributable to a widening of lending margins. A steeper yield curve, tighter credit standards in decisions to lend to the non-financial sector and diminished competitive pressures all contributed to the widening of lending margins. Despite a surge in loan-loss provisions, the overall strength of revenues, together with decisive cost-cutting measures – including the reduction of headcounts, the exploitation of synergies in activities and the disposal of non-core assets and businesses – underpinned a recovery in the median return on equity of euro area LCBGs to above 5% in each of the first three quarters of 2009, after the heavy losses endured in the second half of 2008. That said, the dispersion of performances among individual institutions remained considerable. Moreover, there are concerns that the strengthening of profitability could prove transient since the extraordinarily

supportive environment for investment banking activities may not persist as market conditions normalise.

With regard to the solvency of euro area LCBGs, the recent strengthening of earnings, a slowdown in the growth of both risk-weighted and total assets as well as increases in capital, both from public and private sources, have all contributed to a relatively broad-based increase in regulatory capital ratios above pre-crisis levels. Even those institutions with the lowest capital ratios still have capital buffers that comfortably exceed the minimum requirements. However, in an environment where markets have been pressuring banks to keep a lid on their leverage, it cannot be excluded that institutions with relatively low capital ratios may yet have to raise additional capital if the quality of their assets should take a turn for the worse.

Turning to the funding market conditions faced by euro area LCBGs, there have been several positive developments over the past six months. Some narrowing of LCBGs' customer funding gaps – i.e. the shortfall of deposits relative to customer loans – has meant slightly lower reliance on wholesale funding. At the same time, the cost of short-term funding eased, thanks to the monetary policy stance and the non-standard measures taken, especially the one-year LTROs. The broad-based recovery in capital markets has also meant that longer-term funding has become cheaper and easier to obtain. In particular, spreads on bank bonds declined. While it is difficult to disentangle funding supply and demand effects in explaining contained bank balance sheet growth, the fact that the issuance by LCBGs of bonds with government guarantees, which have a cost, has tapered off, while issuance of bonds without guarantees has recovered, is indicative of improved access to capital markets. Moreover, euro area banks have only taken up about a quarter of the total liability guarantee commitments made by governments. Respondents to the ECB bank lending survey have also indicated that their access to wholesale funding has improved considerably across

the whole maturity spectrum since late 2008. However, the bulk of respondents continued to indicate that their ability to transfer risks via the securitisation markets remained hampered and that this situation is expected to prevail for some time to come. At the same time, heterogeneity among individual institutions remains in accessing wholesale funding, reflecting differences in balance sheet conditions. In the context of the discussion on the possible timing of disengagement from public support and its sequencing, there are some concerns about the structure of funding profiles of certain banks, especially in view of the fact that more than one-third of the unsecured debt of LCBGs will have to be rolled-over before the end of 2011.

Looking ahead, the resilience of asset quality to a still challenging, albeit improving, macro-financial environment is likely to be pivotal for the future financial soundness of euro area LCBGs. Looking back over the period since mid-2007, when stresses initially erupted in financial systems, the shock-absorbing capacities of banking systems have been tested by two distinct waves of write-downs. In the first wave, which was largely unexpected, numerous large banks endured sizeable marking-to-market write-downs of structured credit products on and off their balance sheets, as well as other problems caused by the seizure of credit markets. Some banks were also confronted with counterparty credit losses on exposures to individual institutions such as Lehman Brothers. This wave, which had the character of a short, sharp shock, triggered a loss of confidence in financial stability and set off an adverse feedback loop between financial sector developments and the performance of the real economy. Connected with this, a second wave of write-downs was unleashed in the first half of 2009 as the credit quality of loans deteriorated in tandem with economic performance and prospects. The financial statements of euro area LCBGs for the third quarter of 2009 indicate the extent of the credit quality deterioration already underway with loan-loss provisions as a percentage of total loans reaching the highest level seen in any of the preceding five years.

The first wave of write-downs hit many, albeit not all, euro area LCBGs, but most medium-sized banks managed to avoid it. While the second wave is also affecting some institutions that suffered from the first, it is affecting a much broader range of institutions, including those that were more or less unscathed by the marking-to-market write-downs on structured credit products and other related problems experienced earlier. Given that the second wave is likely to be more drawn-out, but also more predictable in nature, than the first, its consequences can be better planned for. However, its impact will be felt differently across the banking industry. In particular, some institutions that were weakened by the first wave of write-downs and which were subsequently strengthened through government support often had sizeable investment banking franchises. Many of the institutions that escaped the first wave are focused on more traditional commercial banking business lines and have become increasingly vulnerable to the prospect of broad-based loan book deterioration. In this connection, new estimates of ECB staff indicate that probable cumulative loan write-downs for the euro area banking system over the period from mid-2007 to the end of 2010 will surpass those on structured credit securities. In addition, there are concerns about portfolio concentration risks in some banks with exposures towards commercial property markets and central and eastern European economies, where the situation remains fragile.

Turning to large euro area insurers, despite the recovery in financial markets, most institutions reported lacklustre financial performances for the second and third quarters of 2009. This was mainly because underwriting was challenged by high risk aversion among retail investors, which reduced demand for life insurance products, especially that for unit-linked products – where the investment risk is borne by the policyholder. At the same time, non-life insurance underwriting was adversely affected by the weak pace of economic activity. Looking ahead, euro area insurers continue to be confronted with risks associated with the weak economic environment.

Nevertheless, the capital positions of insurers improved in the second and third quarters of 2009, thanks in part to the rebound in capital markets which led to a recouping of some of the unrealised losses suffered in 2008. This and the fact that insurers usually keep their capital levels above regulatory requirements, so as to achieve targeted credit ratings, suggest that most of them would not be unduly challenged by plausible adverse disturbances. In this vein, over the past six months, the CDS spreads of major euro area insurers have fallen back to levels last seen in mid-July 2008, although they still remained above the pre-crisis levels of mid-2007.

#### OVERALL ASSESSMENT OF THE EURO AREA FINANCIAL STABILITY OUTLOOK

Strains on the euro area financial system have clearly been diminishing, thanks to financial sector support programmes, macroeconomic stimulus and the ongoing economic recovery. In particular, the downside protection that governments have provided for financial institutions' balance sheets has contributed to an abatement of tail risk and lowered systemic risk. Together with the improving global economic outlook, which helped to attenuate corporate sector credit risks on both sides of the Atlantic, the decline in systemic risk brought about a turnaround in financial markets, which facilitated a strengthening of the balance sheets of LCBGs. It also helped to improve the balance sheet conditions of insurers and hedge funds. Notwithstanding the recent improvement, the central scenario is for subdued banking sector profitability in the short to medium term, given the prospects of broad-based loan book deterioration, as well as market and supervisory authority pressure on banks to keep leverage under tight control.

Apart from the fragilities linked to the central scenario, there are a number of risks and vulnerabilities, stemming both from outside and from within the euro area financial system, that render the financial stability outlook uncertain. Outside the euro area financial system, there are concerns about the condition of

non-financial sector balance sheets. In parts of the euro area corporate sector, profit margins are thin and external financing conditions remain tight, giving rise to the possibility of greater-than-expected corporate sector loan write-offs and defaults. There is also concern that weak economic activity may translate into greater than expected default correlations on loans to SMEs. In this environment, banks with exposures to SME loans will need to ensure that they have set aside sufficient capital to absorb unexpected write-downs. At the same time, households are facing greater income risks in a macroeconomic environment where the risk of higher unemployment rates has risen. The surge of government indebtedness is also a cause for serious concern since it entails the risk of a crowding out of private sector financing and leaves the sustainability of public finances vulnerable to a potential faltering of the economic recovery. The intertwining of prospects for financial stability and fiscal sustainability, created by government financial sector support measures, fiscal stimulus and weak economic activity, is also a source of risk.

With regard to the vulnerabilities within the financial system, there are reasons to be cautious about the durability of the recent recovery of LCBGs' profitability. The extraordinarily supportive environment for investment banking activities is unlikely to persist as market conditions begin to normalise. At the same time, maturity transformation-related income is vulnerable to a flattening of the yield curve. In addition, vulnerabilities related to concentrations of lending exposures to commercial property markets and to CEE countries could be revealed by adverse disturbances. There is also some concern that the recent recovery of financial markets could prove vulnerable to setbacks if macroeconomic outcomes fail to live up to optimistic expectations. As in the case of LCBGs, insurers and hedge funds have benefited from the recent market recovery, but a setback in financial markets could create new challenges for financial institutions with exposures to market risk.

All in all, the challenges facing the euro area banking sector in the period ahead call for caution in avoiding timing errors in disengaging from public support. In particular, exit decisions by governments will need to carefully balance the risks of exiting too early against those of exiting too late. Exiting before the underlying strength of key financial institutions is sufficiently well established runs the risk of leaving some of them vulnerable to adverse disturbances, possibly even triggering renewed financial system stresses. Late exits, on the other hand, can entail the risk of distorting competition, creating moral hazard risks that come with downside protection – including the possibility of excessive risk-taking – as well as exacerbating risks for public finances.

To cushion the risks that lie ahead, banks will need to be especially mindful in ensuring that they have adequate capital and liquidity buffers in place. If the circumstances require it, some banks may need to raise new and high-quality capital. In addition, some banks, especially those which have received state support, may need fundamental restructuring in order to confirm their long-term viability when such support is no longer available. This could involve the shrinking of balance sheets through the shedding of unviable businesses with a view to enhancing their profit-generating capacities. Indeed, such restructuring is already underway for some large banks of the euro area. At the same time, banks should take full advantage of the recent recovery in their profitability to strengthen their capital positions, so that the necessary restructuring of their businesses and the enhancement of shock-absorbing capacities do not impinge materially on the provision of credit to the economy.



## II THE MACRO-FINANCIAL ENVIRONMENT

### I THE EXTERNAL ENVIRONMENT

*The gradual improvement of the global economic outlook, fostered by large outlays for financial sector support measures and economic stimulus packages, has led to a more favourable global financial stability outlook since the June 2009 Financial Stability Review was finalised. More optimistic expectations have been reflected in an easing of stresses and better conditions in mature financial markets, with a surge in equity prices and a narrowing of credit spreads. Against this background, the balance sheet tensions of some global banks and non-bank financial institutions have been reduced. That said, a number of vulnerabilities remain, not least because the improvement of financial conditions remains reliant on public support. At the same time, risks remain in the US housing and commercial property markets, while the rate of non-financial corporate defaults continues to be high. In addition, some banks – especially those with exposures to emerging markets or securitisation, and now impaired funding strategies – remain vulnerable to sudden deteriorations across funding markets, as well as to the possibility of a broad-based rise in credit risk. Hence, while the outlook for financial stability has improved, the possibility of a setback remains a concern.*

#### I.1 RISKS AND FINANCIAL IMBALANCES IN THE EXTERNAL ENVIRONMENT

##### GLOBAL FINANCIAL IMBALANCES

Since the finalisation of the June 2009 Financial Stability Review (FSR), the adjustment of global current account imbalances has continued. The main factors driving this were the global economic slowdown and the concurrent decrease in global trade, as well as the overall fall in commodity prices, especially energy, from the peaks of late 2008. At the same time, the process of global deleveraging slowed and the retrenchment of capital flows began to abate.

The current account deficit of the United States, the main deficit economy, declined to USD 406 billion (in annualised terms) or 2.9% of GDP in the first half of 2009; it has been

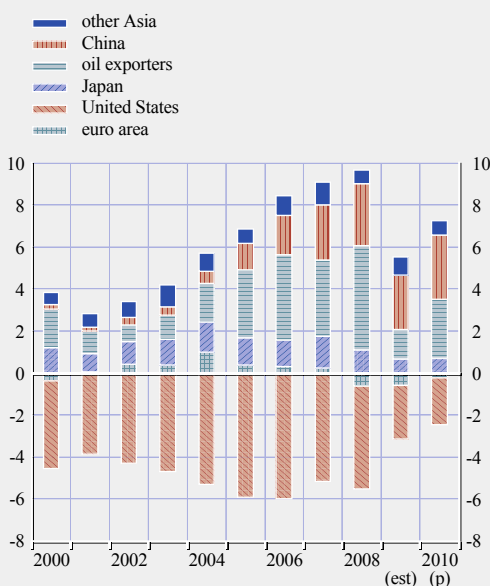
projected by the International Monetary Fund (IMF) to decrease further in the second half of the year, and to reach 2.6% of GDP for the year 2009 as a whole (see Chart 1.1). The projected decline of 2.3 percentage points between 2008 and 2009 reflects expected weakness in private consumption as US households increase their savings to strengthen their balance sheets.

The major counterparts to the adjustment of the US current account balance continued to be the surplus economies of eastern Asia and the oil-exporting countries. The current account surplus of Japan decreased by almost 1 percentage point in the first half of 2009 and is projected to narrow to 1.9% of GDP in 2009, on account of weak external demand and the appreciation of the yen during the second half of 2009.

China's current account surplus also continued to shrink in 2009, as real GDP rebounded strongly in the second and third quarters of the year. Furthermore, robust domestic demand helped imports to outpace exports.

Chart 1.1 Current account balances for selected economies

(2000 – 2010; percentage of US GDP)



Source: International Monetary Fund World Economic Outlook.

The IMF has accordingly projected the current account surplus of China to decline by 2 percentage points to 7.8% of GDP in 2009. This decline is attributed to the impact of weak external demand from mature economies for Chinese exports, which is expected to be only partly offset by weaker domestic demand for imports.

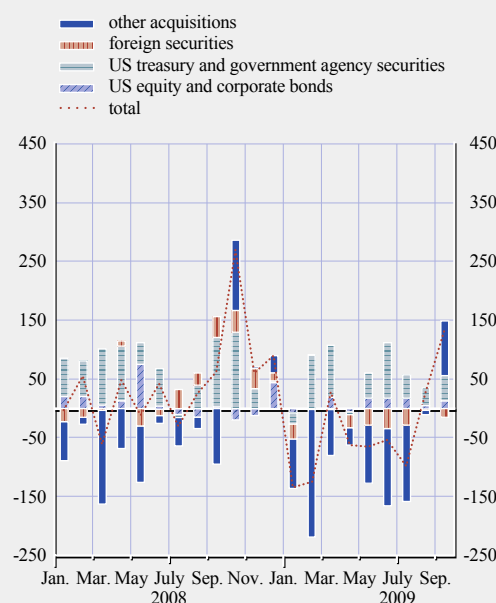
Likewise, as a result of the fall in oil prices from the peak levels reached in the summer of 2008, the current account surpluses of oil-exporting countries are projected to decrease substantially, or even to turn into deficits, in 2009. The rebound in oil prices seen since mid-2009 – when the so-called green shoots of a global recovery began to emerge – could lead to higher-than-currently projected surpluses. During the second half of 2009, the rapid adjustment of the current account surpluses of Asian and oil-exporting economies began to lose momentum, as oil prices started to recover and global trade appeared to stabilise.

At the same time, the process of retrenchment of global capital flows has begun to abate. For instance, the recovery in US acquisitions abroad since the finalisation of the last FSR suggested that appetite for risk had started to improve across the globe (see Chart 1.2). It also indicated that a decline in home bias had halted the repatriation of foreign investments by US residents.

Furthermore, since mid-2009, the appetite of foreign investors for riskier US assets has partially returned, most notably for equities. On the other hand, foreign investors continued to sell US agency debt, and also reduced their purchases of US Treasury securities. This coincided with persistent stresses in global financial markets, despite a far-reaching normalisation of global financial market conditions after the finalisation of the last FSR (see Box 1).

**Chart 1.2 US portfolio investment capital flows**

(Jan. 2008 – Sep. 2009; USD billions; a positive figure denotes an inflow (above) or positive stock)



Source: US Treasury International Capital System.

This ongoing process of adjustment in global current and financial accounts, however, has been rather fragile, as it remains largely driven by cyclical factors related to the financial crisis – including the drop in private demand, lower oil prices and corrections in asset prices – rather than by structural factors.

Looking ahead, the sustainability of the global recovery and an orderly correction of global imbalances will hinge on managing risks such as the possibility of the US current account deficit widening again, on account of the fiscal stimulus measures, and that emerging economies may continue to self-insure themselves against the threat of crisis by accumulating reserves. In addition, insufficient exchange rate flexibilities in some emerging economies could also foster a renewed build-up of imbalances.

## Box I

## A GLOBAL INDEX OF FINANCIAL TURBULENCE

In order to understand the impact and assess the severity of episodes of financial turmoil, including the current financial crisis, it is useful to highlight the key features of stress in global financial markets and to put them into a historical perspective. This box presents the key features of a global index of financial turbulence (GIFT) that identifies a number of dimensions of financial stress that have been emphasised in the literature.<sup>1</sup> This index shows that, although stresses in global financial markets remain at historical highs, financial market turbulences continued to abate after the finalisation of the June 2009 FSR.

In order to measure financial stress, the GIFT captures developments in three financial market segments, namely in the fixed income, equity and foreign exchange markets. Measures of financial turbulence in these markets are constructed by looking at indicators of price pressures, along with volatility, the latter a proxy for heightened uncertainty, and increased risk-aversion. Episodes of financial stress are identified using an index based on high-frequency price variables. The index is constructed as a variance-weighted average of sub-indices associated with stress in the corresponding market sub-segment. There are many potential candidate variables for inclusion in the GIFT, but the objective is to effectively capture underlying market developments and risks using timely data. The index includes data for the world's 29 main economies.<sup>2</sup>

Stress in fixed income markets is identified by changes in the term spread, the so-called TED spread and the international spread. The term spread is calculated as the difference between the three-month and three-year yields on securities issued by the government. As financial intermediaries generate income by intermediating short-term liabilities into longer-term assets, a negative term spread implies significant stress for the financial system. The TED spread is calculated as the difference between the three-month money market rate and the three-month government bond yield. It indicates the degree of perceived credit risk in the economy: when the TED spread increases, it often indicates that lenders believe that counterparty risk is rising. The international spread is defined as the difference between the three-month government bond yield and the average of the three-month government bond yield in the sample, representing the relative stress of the economy's financial system.

Tensions in equity markets are identified by calculating monthly stock market returns, with a drop in stock prices implying a rise in financial stress. In addition, time-varying stock return volatility and turbulence in foreign exchange markets are derived from a GARCH(1,1) model specification. They capture the degree of uncertainty in equity and foreign exchange markets.

1 The GIFT builds on and extends related work conducted at the IMF. See R. Cardarelli, S. Elekdag, and S. Lall, "Financial Stress, Downturns, and Recoveries," *IMF Working Paper Series*, No 09/100, IMF, 2009; and IMF, *World Economic Outlook*, October 2008 and April 2009.

2 The sample includes the following economies: Argentina, Australia, Brazil, Canada, China, the Czech Republic, Denmark, the euro area, Hong Kong, Hungary, India, Indonesia, Korea, Malaysia, Mexico, New Zealand, Poland, Philippines, Russia, Singapore, South Africa, Sweden, Switzerland, Taiwan, Thailand, Turkey, the United Kingdom and the United States. One reason for choosing a limited set of variables is that the marginal information content of additional variables is diminishing, as many contain very similar qualitative patterns. Second, the chosen markets cover a large set of macroeconomic factors – reflected in equity market valuations, the term structure of interest rates, and exchange rates – as well as financial market variables reflecting money market conditions, corporate bond markets, volatility, etc. Finally, concentrating on the main financial market segments allows a broad set of countries to be included over a reasonably long time horizon, while at the same time ensuring data availability in real time. As a result, the construction of the GIFT is deliberately parsimonious at this stage.

Each time series is adjusted for the sample mean, standardised by the sample standard deviation and subsequently filtered to minimise noise stemming from the highest frequencies. To ensure that the index is restricted to values in the range of 0 (low stress) to 100 (high stress), the filtered standardised time series is converted through a logistic transformation. For each market and economy, regional market-specific indices are calculated by taking the average of the converted components. As a result, the corresponding world index is a weighted average of the individual country and market-specific indices, and changes in the GIFT can be attributed to developments in a specific market or country.

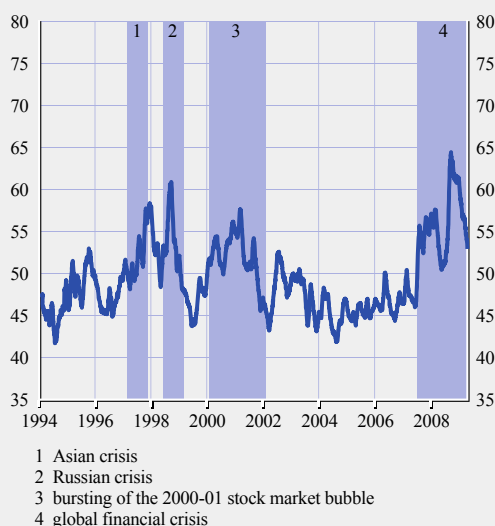
The global index of financial turbulence is presented in Chart A. The global financial crisis that started in 2008 represented a historical peak for the GIFT. Sub-market indices indicate that the peak of the GIFT during October 2008 was associated with a massive fall in stock market returns, a rise in spreads and an increase in stock market and foreign exchange volatility (see Chart B).

Since then, and including the period since the finalisation of the June 2009 FSR, the GIFT has declined steadily, mainly on account of the rebound of stock prices and a normalisation of money market conditions, but also because of narrowing spreads and decreasing volatility in foreign exchange markets. Nevertheless, financial market stress remains at historically high levels, comparable only with those reached during the currency crises in the late 1990s and the stock market crash that followed the bursting of the New Economy bubble around the turn of the century.

The GIFT also performs well in identifying other past periods of financial turbulence, such as the increase in financial stress associated with the Asian crisis that started in July 1997. Similarly, the Russian debt crisis in August 1998 and the collapse of LTCM in September 1998 are also

Chart A GIFT – global index of financial turbulence

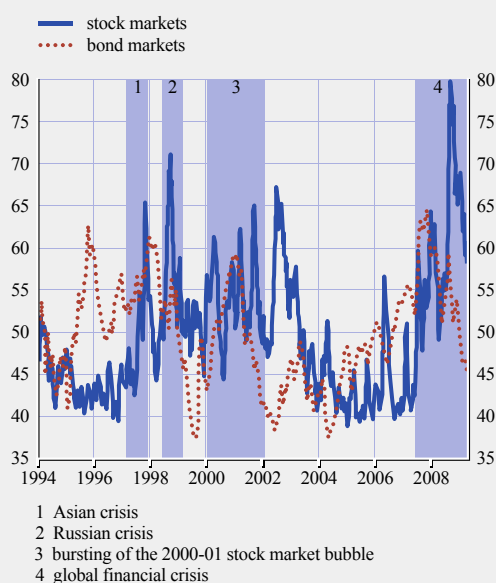
(Jan. 1994 – May 2009)



Sources: Bloomberg and ECB calculations.

Chart B GIFT – market sub-indices

(Jan. 1994 – May 2009)



Sources: Bloomberg and ECB calculations.

identified by the GIFT. The terrorist attacks of 11 September 2001 and the Enron scandal at the end of that year, as well as the Argentine crisis, are also signalled by the index.

Overall, the GIFT serves as a tool for the monitoring of contemporaneous global financial stress that is useful for policy purposes. Its strength lies in identifying financial stress in real time, allowing market sources of increased turbulence to be understood, as well as geographic differences and transmission patterns. Of course, given these objectives, the GIFT cannot serve as a tool to anticipate stress in a forward-looking manner, or to identify the underlying structural sources of financial stress, for which other, complementary tools are required.

### US SECTOR BALANCES

Turning to external risks stemming from the US economy, there have been some positive developments since the finalisation of the June 2009 FSR, but vulnerabilities nevertheless remain as well.

#### Public sector

Against the background of the US recession, the US Administration has provided the economy with sizeable fiscal stimuli. As a consequence, in its August 2009 outlook, the Congressional Budget Office (CBO) projected the federal budget deficit to rise from 3.2% of GDP in the 2008 fiscal year to 11.2% in the 2009 fiscal year, on the

assumption that current laws and policies remain in place. Further, the fiscal balance is expected to remain in deficit for the next ten years, causing the ratio of federal debt held by the public to GDP to increase from around 40% in 2008 to almost 70% by 2019, while total federal debt is anticipated to be even higher (see Chart 1.3).

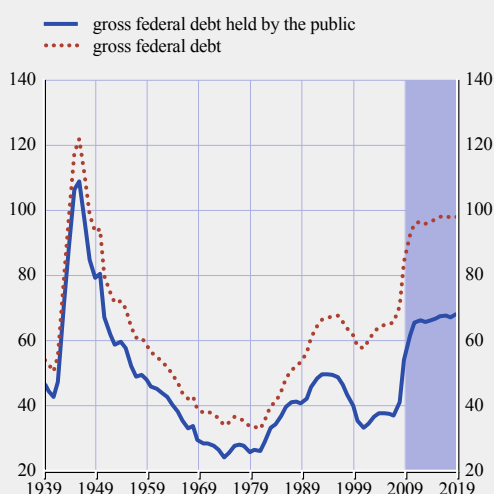
The expected long-term deterioration in the US budget outlook could have global financial stability implications for a number of reasons. First, the increase in sovereign bond issuance could trigger an increase in US bond yields, which could, in turn, spill over to global bonds yields and the cost of capital, possibly affecting the capacity of the banking sector to fund itself. In addition, the increased funding needs of the US government could, over time, contribute to a possible crowding-out of market funding and private sector investment.

#### Corporate sector

The outlook for the US corporate sector has stabilised somewhat since the finalisation of the June 2009 FSR. On a quarterly basis, corporate profit growth turned positive in the first three quarters of 2009 (see Chart 1.4), although profits remained lower than a year before. The improvement in profits in the first three quarters of the year was driven mainly by a turn-around in the profits of domestic financial industries; the contribution from domestic non-financial industries and the rest of the world was more subdued. Risks to the outlook for corporate sector profitability remain, however, as recent profits stem largely from cost-cutting measures, while demand prospects remain relatively weak.

Chart 1.3 US budget outlook

(1939 – 2019; percentage of nominal GDP)

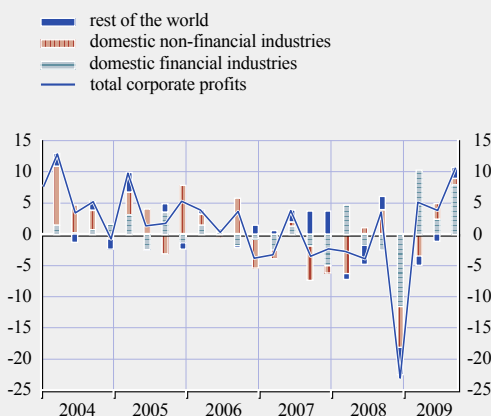


Source: Congressional Budget Office.

Note: Actual data until 2008; projections for the period from 2009 to 2019.

**Chart 1.4 US corporate sector profits**

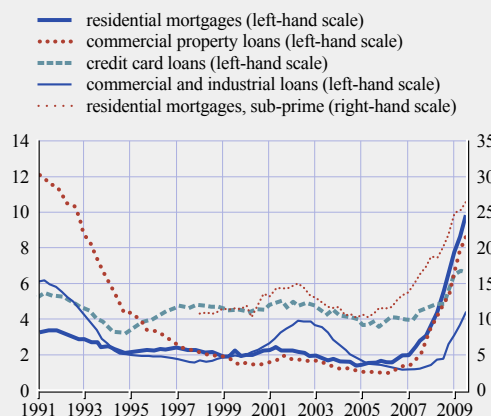
(Q1 2004 – Q3 2009; percentage-point contribution to quarter-on-quarter growth; seasonally adjusted)



Source: US Bureau of Economic Analysis.  
Notes: Corporate profits include inventory valuation and capital consumption adjustments. Profits from the rest of the world (RoW) are receipts from the RoW less payments to the RoW.

**Chart 1.5 Delinquency rates of loans extended by US commercial banks**

(Q1 1991 – Q3 2009; percentage)



Source: Federal Reserve Board of Governors.

Non-financial firms continued to cut their investment expenditure sharply, which – together with a small increase in gross savings relative to GDP – led to a negative financing gap of 1.1% of GDP in the second quarter of 2009. Regarding sources of financing, the flow of bank loans and the net issuance of commercial paper remained negative in the first half of 2009, possibly reflecting the persistent tightness of bank credit conditions and diminished needs for short-term financing (see Section 1.3). This was partly offset by an increase in bond issuance and, in the second quarter of 2009, by a return to positive net equity issuance by non-financial firms following a long period of net equity buy-backs.

As to US non-financial corporate sector balance sheets, they remained strained, which was reflected in a rise in the ratio of debt to net worth in the first half of 2009. Weaker corporate balance sheets have resulted in further sharp increases in loan delinquency rates for commercial and industrial loans, as well as, most notably, commercial property loans, in the second and third quarters of 2009 (see Chart 1.5). As developments in the US commercial property sector tend to lag those in

the residential market, both in terms of activity and in terms of prices (see Chart 1.6), material risks to financial stability arise in relation to this sector going forward, via the direct exposures of bank loan books and commercial mortgage-backed securities.

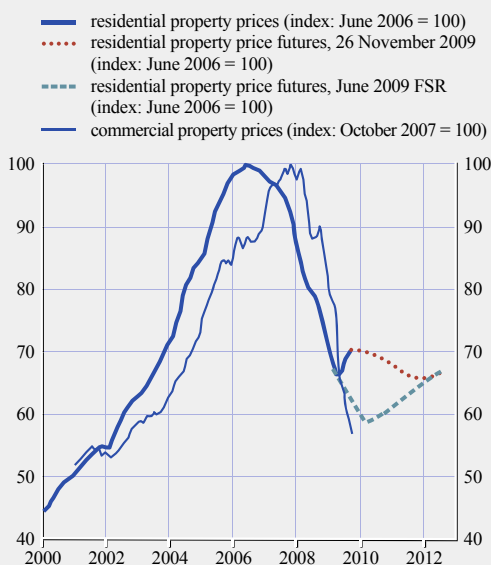
Default rates for speculative-grade corporations appear to have reached their peak in recent months, at levels not far above the peaks observed in the early 1990s and in 2001 (see Chart S3). While still present, the risk of a sharp increase in US speculative-grade corporate defaults has thus diminished somewhat, relative to the June FSR, reflecting the recent improvement in financial conditions and of corporate sector profitability.

#### Household sector

The financial stability risks stemming from the US household sector have also receded somewhat since the finalisation of the last FSR. While household net wealth declined further in the first quarter of 2009, to 475% of disposable income, its lowest value since 1992, it rebounded somewhat as a result of a rise in the value of both financial and property assets in the second quarter. At the same time, low interest rates and some decline in the ratio of

**Chart 1.6 US residential and commercial property prices and market expectations**

(Jan. 2000 – Sep. 2012)

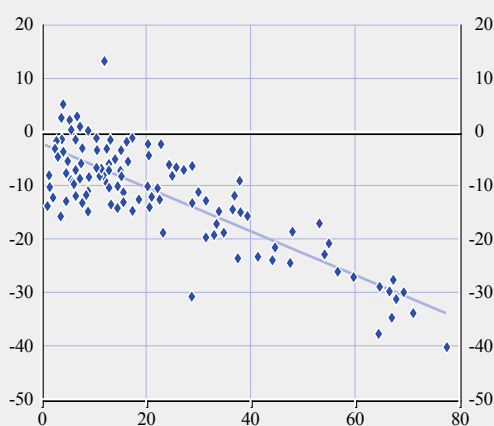


Source: Bloomberg.  
Note: The residential property price index is the S&P/Case-Shiller 10 home price index.

**Chart 1.7 Foreclosure transactions and house prices across Metropolitan Statistical Areas (MSAs)**

(Q2 2009)

x-axis: foreclosure transactions (percentage of total homes sold in the past 12 months)  
y-axis: house price inflation (percentage change per annum)



Source: Zillow.

household debt to income (see Chart S5) have led to a small reduction in financial obligations and debt service ratios from their peaks in end-2007 and end-2006 respectively, although they remained elevated by historical standards (see Chart S6).

Importantly, the US housing market has shown signs of recovery over recent months. Both the rate of home sales and housing construction appear to have bottomed out since earlier this year, while the decline in house prices came to an end in July 2009. These positive developments were reflected in the Case-Shiller futures price index for ten major US cities, which was indicating, at the time of writing, that house prices would remain broadly flat over the next few years (see Chart 1.6 and Box 2).

Risks of a renewed deterioration in the US housing market and, therefore, possible further losses for the financial sector remain, however, for several reasons. First, the revival of the US housing market has been supported, at least partly, by the implementation of tax credits of up to USD 8,000 for first-time buyers, applicable between 1 January 2009 and, following a recent extension, 30 April 2010. Second, the excess stock of vacant homes on the market was still considerable in the third quarter of 2009. Third, delinquencies on mortgages and foreclosures also continued to rise in the second and third quarters (see Chart 1.5). Given the close link between foreclosure transactions and home prices across the US Metropolitan Statistical Areas (see Chart 1.7), this could result in further downward pressures on house prices.

## Box 2

### HOUSING PRICE CYCLES IN THE UNITED STATES

Strains in the residential mortgage market in the United States are generally perceived as one of the main triggers of the ongoing financial and economic crisis.<sup>1</sup> Empirical evidence suggests that an expansion in the supply of mortgages, in particular sub-prime mortgages, during the period when US house prices were rising was largely driven by borrowers and lenders extrapolating the most recently observed house price increases into the future.<sup>2</sup> On the borrowers' side, expectations of future house price appreciation rendered housing both a more attractive and an affordable asset.<sup>3</sup> On the lenders' side, default risk was perceived to be lower, as the loan-to-value ratio was expected to fall with future house price increases. Such myopic behaviour by market participants may have been encouraged by the fact that house prices tend to follow persistent cycles, which might induce market participants to become overly optimistic (or pessimistic) about the outlook for house valuations in each respective state of the cycle.<sup>4</sup> This box introduces an empirical model that tries to capture this peculiar price dynamic and assesses the vulnerability of the US housing market.

The chart below depicts the pronounced cyclicity in US house prices over the period from 1930 to 2007, and two boom-bust periods stand out particularly markedly. First, around the end of World War II, house prices rose by 60% from 1942 to 1947. Second, based on the Case-Shiller US Home Price index, the annual rate of price change increased almost every year from 1998 to 2006, with a cumulative price increase of 85% during that period.

A natural candidate to capture regular switches between periods or regimes of different house price dynamics is a Markov-switching model. In this case, a model specification that allows the mean rate of house price growth to switch between two states appears to effectively capture the essential dynamics of US house prices over the period from 1930 to 2007, based on the annual Case-Shiller US Home Price index.<sup>5</sup> The first identified state is associated with a "hot" housing market – where house prices increase relatively strongly by, on average, 8.9% per annum – and the second to a "cold" market – where house prices increase by, on average, just 0.1% per year.

The regime-switching model also produces estimates of the time-varying probabilities of being in a given state at each point in time, where the state probabilities of the previous period are

1 Sharp downgrades of residential mortgage-backed securities in general, and those of lower quality (sub-prime mortgages) in particular, triggered large drops in the prices of these asset-backed securities, resulting in a general increase in risk aversion and loss of confidence in the financial sector. See Box 2 in ECB, *Financial Stability Review*, June 2009.

2 See K.S. Gherardi, A. Lehnert, S.M. Sherland and P. Willen, "Making Sense of the Sub-prime Crisis," *Brookings Papers on Economic Activity*, forthcoming; and W.N. Goetzmann, L. Peng and J. Yen, "The Subprime Crisis and House Price Appreciation," *NBER Working Paper Series*, No 15334, National Bureau of Economic Research, 2009.

3 For example, the majority of the loans in the sub-prime sector were hybrid adjustable-rate mortgages; rates were fixed for two to three years and adjustable thereafter. As these adjustable rates were expensive, it was assumed that they would be refinanced at the end of the two to three-year period, taking into account house price appreciation. When house prices began to decline in 2006, a wave of defaults occurred. See D. Jaffee, A. Lynch, M. Richardson and S. Van Nieuwerburgh, "Mortgage origination and securitization in the financial crisis", in V. Acharya and M. Richardson (eds.), *Restoring Financial Stability*, Wiley, 2009, pp. 61-82.

4 See K.E. Case and R.J. Shiller, "The Efficiency of the Market for Single-Family Homes," *American Economic Review*, 79(1), 1989.

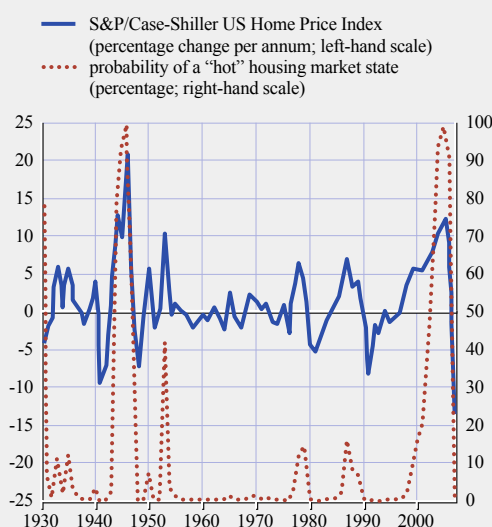
5 For details on the model set-up and estimation, see S. Corradin, J. Fillat and C. Vergara-Alert, "Optimal Portfolio Choice with Predictability in House Prices and Transaction Costs," mimeo, February 2009 (available at: <http://ssrn.com/abstract=1342755>). The Markov-switching model is estimated for the annual Case-Shiller US Home Price index because of the long time series available. Higher-frequency data are not available for a sufficiently long time period and would further complicate the analysis due to seasonality effects.

updated on the basis of incoming house price data as new information. The chart shows the estimated probability of being in a “hot” housing market state. In general, the probability of being in a “hot” state is rather low, except in periods of great price appreciation, indicating that “hot” housing market states in the United States tend to occur relatively infrequently. This is also reflected in the estimated (time-invariant) transition probabilities of switching to the alternative regime in the next period, assuming that the market is in a given state in the current period. For the “cold” market state, this transition probability is only about 4%, while it is 28% for the “hot” market state. Moreover, the probability of being in the “hot” growth state is greater than 50% only on two occasions. Those two occasions are identified with World War II and the most recent housing market boom. Regarding the latter, the probability of being in a “hot” state began to grow in 1996, reached its peak of almost 100% in 2005, and stayed at 90% in 2006. “Hot” market states with such high probabilities are extraordinary by historical standards and proved to be short-lived, superseded by a downward correction in aggregate housing prices.

Against this background, the estimated probability of being in a “hot” housing market state could be taken as an indicator of the degree of vulnerability of the US housing market and related asset markets. Viewed in this light, the analysis suggests that the most recent housing market boom in the United States, which eventually led to the ongoing global financial and economic crisis, was indeed a very unusual and, by nature, fragile situation compared with the more regular house prices dynamics observed in that economy.

### US housing prices and the probability of being in a “hot” housing market state

(1930 – 2007)



Sources: Standard & Poor's and ECB calculations.

## REGION-SPECIFIC IMBALANCES

### Non-euro area EU countries

Macroeconomic and financial conditions appear to have stabilised in the non-euro area EU countries since the June 2009 FSR, although significant vulnerabilities and uncertainties remain.

In the United Kingdom, Sweden and Denmark, there are signs of macroeconomic stabilisation. Bank funding conditions have improved somewhat, although financial conditions remain fragile. The prospects for economic activity are underpinned by considerable stimuli following

the easing of monetary and fiscal policies, and past currency depreciations (in Sweden and the United Kingdom). At the same time, credit conditions are likely to remain tight, as banks continue to repair their balance sheets, and high debt levels still weigh on consumer spending. As a result of the persistent tightness of household credit conditions, house prices continued to decline, in year-on-year terms, in all three countries. There were, however, some signs of stabilisation, particularly in the United Kingdom, where activity in the housing market picked up, following a period of weakness. In the wake of the contraction in economic activity, labour market conditions

continued to weaken in all three countries. As unemployment increases further, debt servicing may become more challenging for households, particularly if house prices decline further.

Vulnerabilities in central and eastern European (CEE) countries have eased since the June 2009 FSR, but the economic and financial situation there remains fragile. The pace of contraction in economic activity has moderated and some countries recorded modest positive growth rates. The reduced risk aversion towards the region that emerged earlier in the year has been reflected in declining government bond yields and credit default swap (CDS) spreads, although both remain above pre-Lehman Brothers levels in most CEE Member States. Moreover, sovereign bond issuance has resumed in some CEE countries, but borrowing conditions remain less favourable than in the months immediately preceding the collapse of Lehman Brothers. Stock prices also increased markedly and most floating currencies in the region have appreciated over the past six months. Some macroeconomic imbalances in the region have been unwinding quickly. Current account deficits, for example, have fallen significantly from their earlier peaks, and some countries now have surpluses (see Chart 1.8).

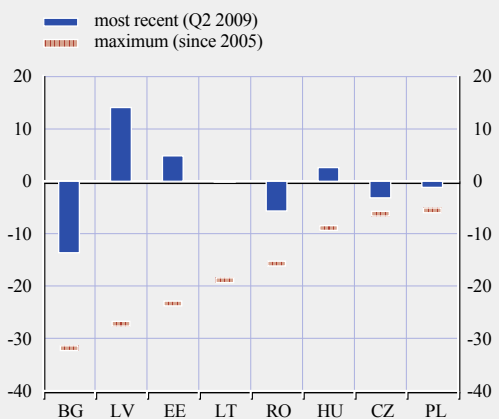
At the same time, the level of external debt remains high, external funding remains expensive and there is a risk that exchange rate volatility could increase again. While capital flows into the region have rebounded slightly from previous lows, they remain limited and interest rate spreads may remain higher than before the crisis for some time to come.

Although the CEE countries are often regarded as a single region, macroeconomic differences across the countries are significant and seem to have increased recently. Some countries, mainly in central Europe, have weathered the crisis without a sharp contraction in economic activity as external and internal imbalances there were less pronounced than in other countries. Other countries, such as those in the Baltic region, have faced sharp contractions in economic activity, following the unwinding of large imbalances and external financing difficulties. As a result of these differences, vulnerabilities also vary across the countries in the region.

In several CEE economies, vulnerabilities stem from the significant proportion of outstanding bank loans that are denominated in currencies other than borrowers' income currency or euro in the countries with a fixed exchange rate to the euro (see Section 4.2). This tends to hold particularly true of households. In countries with flexible exchange rates, currency depreciations initially increased the debt service burden associated with foreign currency loans. However, this was partially or almost fully compensated for by a lowering of interest rates on foreign currency loans and more recent reversals of the currency depreciations in most countries. In countries with a large stock of outstanding foreign currency credit, a renewed weakening of these currencies could trigger a significant further deterioration in banks' asset quality. Central banks and supervisory authorities in CEE countries have implemented measures, or announced initiatives, to address macro-prudential risks stemming from foreign-currency lending by tightening regulations on bank lending conditions attached to foreign currency-denominated loans.

**Chart 1.8 Current account balances for a group of non-euro area EU countries**

(percentage of GDP)



Source: Eurostat.

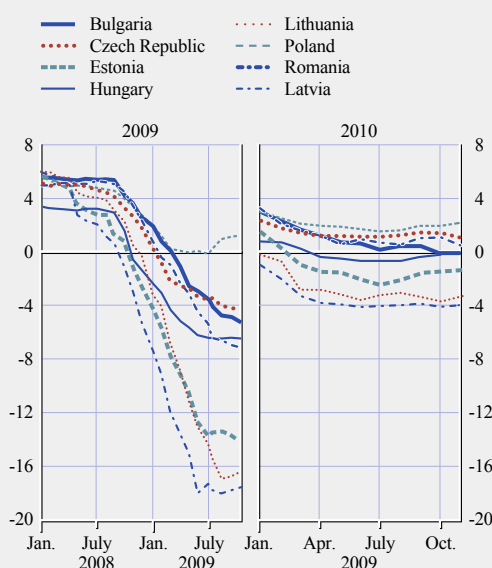
In the wake of the weakening of economic activity in the CEE region, the deteriorating quality of bank assets is likely to become an important vulnerability, particularly in economies affected by large contractions in output. The quality of loan portfolios has deteriorated as labour market conditions weakened, corrections in the property market continued, incomes declined and real interest rates increased, although real GDP growth projections have stabilised somewhat in the last few months (see Chart 1.9).

The vulnerabilities in some countries in the region have been mitigated by the funding provided by IMF/EU financial assistance programmes. In the EU, three such programmes are currently in place (in Hungary, Latvia and Romania). These programmes are accompanied by the Bank Coordination Initiative (established by the IMF, the European Commission and the European Bank for Reconstruction and Development), under which parent banks commit to maintaining their exposure in host countries. Adjustment efforts are helping to correct the macroeconomic imbalances in these economies and there has been progress in normalising access to private sources of financing.

Looking ahead, the macroeconomic outlook in the non-euro area EU countries has improved somewhat since the finalisation of the previous FSR, although there is still an unusually high degree of uncertainty. Rising unemployment,

**Chart 1.9 Evolution of GDP growth projections for 2009 and 2010 for a group of non-euro area EU countries**

(Jan. 2008 – Nov. 2009; percentage)



Source: Consensus Economics.

lower incomes and corporate defaults are likely to lead to a further increase in loan delinquencies and a further deterioration of bank loan portfolios. In addition, potential capital outflows triggered by, for example, a possible renewed increase in risk aversion towards the region could result in severe loan losses, eroding the capital and asset quality of parent banks and their subsidiaries.

### Box 3

#### STRESS TESTS CONDUCTED IN EU MEMBER STATES IN CENTRAL AND EASTERN EUROPE

Many non-euro area EU Member States in central and eastern Europe have experienced a significant worsening of macroeconomic conditions since the start of the current financial turmoil. From a financial stability perspective, it is crucial to assess whether the financial systems in these countries would be capable of weathering plausible but severe shocks, over and above the central scenario of macroeconomic correction. There is a broad consensus that macro stress tests are a useful tool for making such assessments and, accordingly, the authorities in almost all euro area and non-euro area EU Member States in central and eastern Europe have carried out such exercises in the course of 2009. The nature of the stress tests conducted differed across countries, reflecting variations in business cycle developments, as well as differences in specific sources

of risk and vulnerability. Nevertheless, the exercises in many countries assessed the sensitivity of non-performing loan rates and capital adequacy ratios to a worsening of economic conditions that was more severe than projected. This box, which draws upon findings published by the national central banks of the EU Member States in this region, summarises the key conclusions of these exercises (see the table below).

All in all, the outcomes of the macro stress tests conducted by authorities in countries of central and eastern Europe point to resilience under severe but plausible macroeconomic scenarios. While there are considerable differences in the range of shocks applied to GDP and the sensitivity of

#### Outcomes of macro stress tests involving severe macroeconomic scenarios in central and eastern European countries

| Country<br>(cut-off date<br>of data used) | Main assumptions<br>of the scenario with<br>respect to the baseline<br>(decline in GDP growth) | Increase in<br>non-performing<br>loan rates                                 | Average decrease<br>in capital adequacy<br>ratios | Overall assessment                                                                                                                                                                                                    |
|-------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bulgaria<br>(July 2009)                   | 13.3 percentage points<br>in 2009 with respect<br>to the average growth<br>during 2004-2008    | around 10 percentage<br>points of all<br>compromised assets                 | 3.6 percentage points                             | The stress tests show the high level<br>of resilience of the Bulgarian banking<br>system with a post-shock capital<br>adequacy ratio being far above<br>regulatory minimum of 12%.                                    |
| Czech Republic<br>(May 2009)              | 1.4 percentage points in<br>2009 and 1.9 percentage<br>points in 2010                          | from 5.4 percentage<br>points to<br>8.9 percentage points<br>across sectors | around 0.7 percentage<br>points                   | The stressed capital adequacy ratio is<br>far above the regulatory minimum even<br>in a protracted period of recession.                                                                                               |
| Estonia<br>(June 2009)                    | 7.8 percentage points in<br>2009 and 4.1 percentage<br>points in 2010                          | up to 10.5 percentage<br>points                                             | 2.8 percentage points                             | The Estonian banking sector will meet<br>the capital adequacy requirement on an<br>aggregate basis in 2009.                                                                                                           |
| Hungary<br>(August 2009)                  | 1.2 percentage points in<br>2009 and 3.8 percentage<br>points in 2010                          | loan-loss rates up by<br>around 2 percentage<br>points (see note)           | around 4 percentage<br>points                     | The banking sector's average capital<br>adequacy ratio stays above the<br>regulatory minimum in the stress<br>scenario; recapitalisation needs remain<br>manageable.                                                  |
| Latvia<br>(June 2009)                     | 2 percentage points in<br>2009                                                                 | over 90 days past<br>due loans rate up by<br>9.1 percentage points          | 5.5 percentage points                             | Recent capital injections have increased<br>loss-absorption capacity for potential<br>future losses. In addition, several banks<br>are in the process of increasing share of<br>capital or issuing subordinated debt. |
| Lithuania<br>(December 2008)              | Fall of 30% in housing<br>prices; increase in<br>interest rates                                | Not available                                                               | around 6 percentage<br>points                     | Increased capital buffers of the banking<br>system have improved the capacity of<br>banks to absorb credit risk losses.                                                                                               |
| Poland<br>(June 2009)                     | 2 percentage points in<br>2009 and 4.3 percentage<br>points in 2010                            | impairment charges<br>up by 3 percentage<br>points (see note)               | around 4 percentage<br>points                     | Even in the case of the adverse<br>scenario, the recapitalisation needs<br>remain relatively low.                                                                                                                     |
| Romania<br>(June 2009)                    | 1.5 percentage points in<br>2009 and 2.5 percentage<br>points in 2010                          | from 2 percentage<br>points up to<br>18 percentage points<br>across sectors | around 4.5 percentage<br>points                   | The capital adequacy ratios of banks<br>remain above the regulatory minimum;<br>some capital is needed to achieve the<br>targeted capital buffers.                                                                    |
| Slovakia<br>(June 2009)                   | 2.5 percentage points in<br>2009 and 1.6 percentage<br>points in 2010                          | from 3 percentage<br>points to<br>15 percentage points<br>across sectors    | around 4 percentage<br>points                     | Compared with the results of December<br>2008, the banks' ability to absorb even<br>extreme shocks improved in the first<br>half of 2009.                                                                             |

Sources: Financial stability reports and press releases of national central banks.

Notes: Results for other countries in central and eastern Europe were not available. The loan-loss rates used for Hungary were a product of the probability of default and losses given default. In the underlying scenarios, other macroeconomic variables worsened as well, such as unemployment, inflation and, in some cases, interest rates and exchange rates.

non-performing loan rates and capital adequacy ratios to these scenarios, the diversity should be mostly seen as a reflection of differences in macroeconomic circumstances and of the composition of balance sheets within banking sectors. Hence, any direct comparison across countries should be avoided. That said, results from macro stress tests can also be sensitive to both the modelling approaches followed and the assumptions used. This potential source of differences may be especially relevant in the case of countries in central and eastern Europe, where sufficiently long data histories of key stress-test inputs (such as probabilities of default and loss-given-default rates) are often missing, requiring assumptions to be made. In this vein, sensitivity-testing of key assumptions can complement the core findings of stress-test exercises. More generally, from a public communication perspective, greater efforts could be made by authorities to disclose more details of the models used and the assumptions adopted in stress tests.

### Emerging economies

Macroeconomic conditions in emerging economies have improved on account of substantial fiscal and monetary policy stimulus measures, both domestic and at the global level, since the finalisation of the June 2009 FSR. Moreover, lower inflation, rising asset prices and, consequently, higher oil and non oil commodity prices have led to a certain revitalisation of private demand.

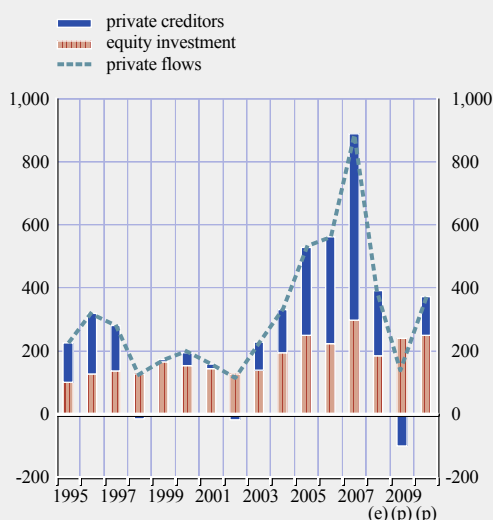
Despite some macroeconomic improvement, emerging economies continued to face acute external financing pressures in the form of cross-border bank lending. According to the International Institute of Finance, total net private capital flows to emerging economies were projected in June 2009 to reach USD 140 billion in 2009, down about one-third on the amount recorded in 2008 and barely 20% of the flows recorded in the peak year of 2007 (see Chart 1.10). Hence, despite the extensive measures taken by the G20 leaders in April 2009, as well as some resumption of private equity inflows to emerging economies, private creditors are expected to withdraw USD 100 billion net from emerging economies in 2009, compared with net inflows of USD 207 billion in 2008 and USD 591 billion in 2007.

Moreover, many emerging market corporates continue to face substantial roll-over risks in their cross-border bonds and syndicated loans, the maturities of which peak at the end of 2009 and in early 2010.

Regarding EU neighbouring countries, the concerns about asset quality and credit risk raised in the June 2009 FSR have materialised to some extent. As real GDP displayed precipitous falls in some of the larger economies in the region in the first half of 2009, non-performing loan ratios are expected to rise further, potentially reaching or even surpassing levels of past financial crises. Consequently, euro area banks with loan exposures to these countries may be negatively affected in cases where such losses have not yet been fully provisioned for. In addition, a failure of private demand to replace

Chart 1.10 Expected retrenchment in net private capital flows to emerging economies

(1995 – 2010; USD billions)



Source: The International Institute of Finance, Inc.  
Note: (e) stands for estimated and (p) for projected.

government stimuli in some countries may again undermine confidence towards the region. This may trigger renewed capital outflows, with possible further negative repercussions for the domestic financial sectors and euro area banks.

Looking ahead, the risk of continued tightness in cross-border lending, global deleveraging, increasingly large public borrowing needs in mature economies and a rising home bias could result in emerging economies' access to international capital markets becoming further impaired. These financial risks are in addition to the macroeconomic risks of a slower than anticipated recovery and the impact of possibly lower global trade on the condition of export-oriented emerging economies. Moreover, in many of the key emerging economies, the recent economic recovery has been supported by sizeable government interventions, the impact of which is expected to decline over the coming year.

## 1.2 KEY DEVELOPMENTS IN INTERNATIONAL FINANCIAL MARKETS

### US FINANCIAL MARKETS

#### The money market

Financial conditions in the US dollar money market have improved considerably since the finalisation of the June 2009 FSR. These developments were largely driven by a favourable general market environment and improved market sentiment towards financial institutions. The publication of the stress test results for major US banks in May 2009, and the subsequent repayment of public funds received under the Troubled Assets Relief Program (TARP), helped to instil confidence in the banking sector. Furthermore, the improvement was also aided by the continued public support measures and prevailing abundant liquidity conditions.

Improvements in financial conditions were apparent from the reduced usage of several Federal Reserve facilities, including the Term Auction Facility (TAF), the Primary Dealer Credit Facility (PDCF) and the Commercial Paper Funding Facility (CPFF). In light of these

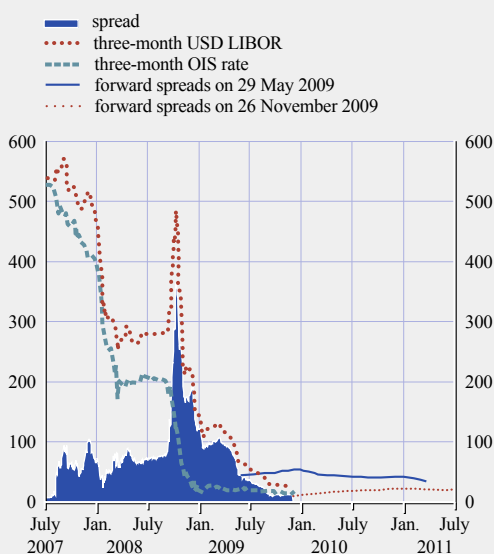
developments, the Federal Reserve announced modifications to a number of its existing programmes on 25 June. A number of facilities were extended until 1 February 2010, however, as it was noted that improvements were not uniform across markets and that the functioning of the market remained impaired in many areas. In August, the Federal Reserve also extended the Term Asset-backed Securities Loan Facility (TALF), reflecting strained conditions in the markets for asset-backed securities (ABSs) and commercial mortgage-backed securities (CMBSs) (see the section on credit markets). Most recently, on 17 November, the Federal Reserve, citing the continued improvement in financial market conditions, reduced the maximum maturity of primary credit loans at the discount window from 90 to 28 days, with effect from January 2010.

The ongoing and gradual repricing of credit and liquidity risk also contributed to an overall decline in the US dollar money market rates in various market segments. The three-month London interbank offered rate (LIBOR) had fallen from 65 basis points, the level at the end of May 2009, to 26 basis points by late November; longer-term rates also eased considerably. The three-month LIBOR-overnight index swap (OIS) spread, a widely used measure of bank counterparty and funding liquidity risk in the money market, was close to its pre-crisis level (see Chart 1.11). At that level, the spread was some basis points below its long-term average. By contrast, and despite a significant narrowing over the past six months, longer-term LIBOR-OIS spreads – for maturities beyond three months – remained at elevated levels, both from a historical perspective and when compared with pre-crisis levels. This highlighted the continuing strains in the money market.

The US commercial paper market continued to contract, reaching a new low at the end of July 2009. The outstanding amount of commercial paper has recovered somewhat since August, albeit from a very low level. Despite the low level of commercial paper rates, issuers did not show much interest in the commercial paper

**Chart 1.11 Contemporaneous and forward spreads between the USD LIBOR and the overnight index swap (OIS) rate**

(July 2007 – June 2011; basis points)



Source: Bloomberg.

market, which suggests that the decline in the amounts of outstanding commercial paper was due both to a diminished need for short-term financing and to the existence of alternative sources of longer-term funding, as issuers preferred to lengthen the maturity profile of their debt. Use of the Federal Reserve's CPFF also declined considerably, as funding markets improved and the facility became increasingly expensive relative to market rates.

Access to US dollar funding for non-US financial institutions has improved since the end of May. Liquidity in the foreign exchange swap market continued to recover and the usage of the Federal Reserve's TAF programme fell significantly. Against this background, the Federal Reserve gradually reduced the maximum amount of credit offered at TAF auctions and announced a gradual phasing-out of longer-term TAF auctions by early 2010. The ECB also terminated its 28-day TAF auctions in July, followed by a suspension of 84-day TAF auctions in October, while continuing to conduct 7-day TAF operations. Furthermore, some European banks reportedly swapped the euro funds received in the one-year

long-term refinancing operation conducted by the ECB on 24 June for US dollars, providing them with longer-term US dollar funding at attractive rates.

Looking ahead, forward spreads indicate that LIBOR-OIS spreads, especially in the three-month maturity segment (see Chart 1.11), are expected to consolidate close to current levels in the coming months. However, higher forward spreads on a longer horizon seem to reflect market expectations that some reversal is expected. As recent improvements in the US dollar money market were to a certain extent aided by the extensive public and central bank measures, the potential withdrawal of this support could present a significant test for the market.

#### Government bond markets

US long-term government bond yields have remained volatile since the finalisation of the June 2009 FSR (see Chart S24). Despite the purchases of Treasury bonds by the Federal Reserve, the US government bond market continued to reflect the counterbalancing influences of the unwinding of flight-to-safety flows, on account of the improvement in economic conditions, the decline in risk aversion (see Chart S18) and the concerns about the absorption of large government bond issuance.

Looking ahead, risks for US government bond yields appear to be on the upside. Part of the uncertainty surrounding bond markets stemmed from the finalisation of the Federal Reserve's Treasury bond purchases in October, particularly as liquidity conditions in the US bond market have improved significantly since the programme started, as reflected in much narrower spreads between bond yields and comparable maturity OISs.

Concerns about the strength and sustainability of the economic recovery are also an important source of uncertainty for bond yields. On the one hand, a weaker-than-expected recovery may lead to a further deterioration in the US fiscal position, and trigger further issuance to cover associated financing needs. On the other hand, a

strong recovery may trigger an upward revision to macroeconomic fundamentals and impact positively on risk appetite, thereby exacerbating the unwinding of previous flight-to-safety flows.

### Credit markets

Since the finalisation of the last FSR, conditions in the US credit markets have continued to improve, although the market has to some extent remained stressed. Corporate bond spreads and CDS premia continued to tighten, as the gradual improvement in the US economic outlook supported investor interest in corporate debt securities (see Chart S36).

While investment-grade corporate bonds were the first to benefit from improved market sentiment, investors' interest in high-yield commercial bonds gradually increased, resulting in less discrimination amongst issuers: borrowers with a high-yield credit profile and subject to cyclical economic activity became increasingly active in the primary market.

Corporate bond issuance increased to record new levels in the United States this year, supported

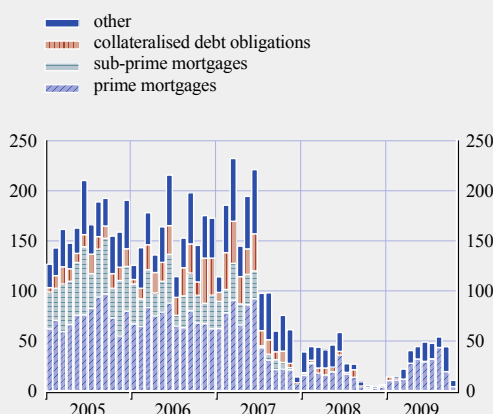
by very dynamic demand, as historically low money market rates fuelled a search for yield, and as the persisting market risks supported portfolio diversification. Strong demand for corporate bonds also resulted from relatively weaker demand for securitised products.

The TALF contributed to the restoration of more normal conditions in some ABS markets. Nevertheless, until October 2009, issuance activity remained substantially lower than before the outbreak of the turmoil (see Chart 1.12). Moreover, private placement of new deals remained constrained, indicating that banks continue to use securitisation for liquidity rather than for capital-raising purposes.

Since the TARP scheme was introduced, CDS spreads on various ABSs have been squeezed considerably and reached levels by the end of November that have not been seen since the collapse of Lehman Brothers (see Chart 1.13). Nevertheless, apart from a positive signalling effect, the TARP may have had a rather limited direct impact on ABS market conditions. Thus far, participation by US banks has remained low.

**Chart 1.12 US banks' issuance of asset-backed securities and collateralised debt obligations by type of collateral**

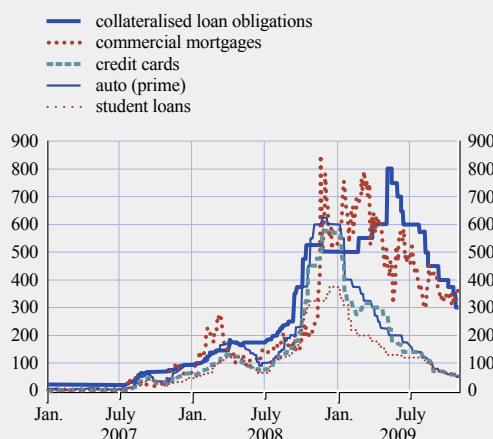
(Jan. 2005 – Oct. 2009; USD billions)



Source: Dealogic.

**Chart 1.13 Credit default swap spreads on various US AAA-rated asset-backed securities and collateralised loan obligations in US dollars**

(Jan. 2007 – Nov. 2009; basis points)



Source: JP Morgan Chase & Co.

Furthermore, conditions in the commercial mortgage-backed securities (CMBS) market have remained stressed over recent months. On account of rising delinquency rates for commercial property mortgages, investors feared the potential for another wave of substantial losses for banks, which have sizeable exposures to this part of the ABS market. In late November, CMBS spreads thus remained high and, according to Dealogic, there has been only one new CMBS deal since August 2008.

Looking ahead, the continued improvement in US credit markets remains dependent on the economic recovery in the United States and on a near-term decline in default rates. A possible downward correction in volatile equities may also negatively affect corporate bonds. In addition, the still very strong investor demand for corporate bonds may eventually weaken, reflecting an “indigestion” of such securities in the primary market. Finally, the outlook for securitisation is uncertain, as it remains strongly driven by the presence of supporting programmes and banks’ demand for funding liquidity.

### Equity market

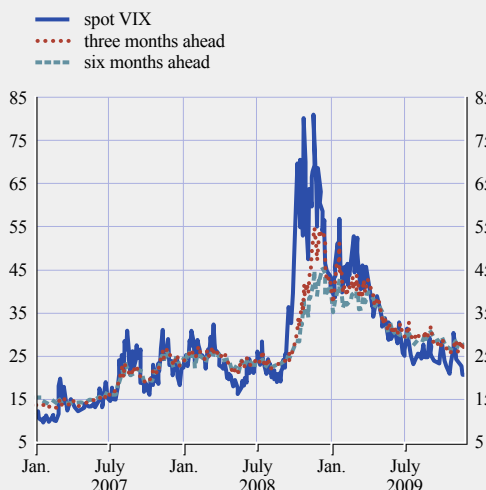
US equity markets continued to develop along the upward trend that started in early March 2009, in line with improving growth and earnings prospects (see Chart S29), and reflecting a rise in risk appetite (see Charts S18 and S26) and lower volatility in the market.

Positive developments in stock prices were well spread across sectors. However, the gains in financial sector stock prices were particularly strong. From a valuation point of view, although the sectoral price/earnings (P/E) ratios for both financial and non-financial stocks have increased significantly over recent months, the ten-year trailing P/E ratio for US stocks remained below its long-run average (see Chart S29), reflecting decreasing uncertainty over near-term stock prices (see Chart S27).

Looking ahead, equity prices appear to reflect a very optimistic scenario of recovery in

Chart 1.14 Implied volatility in US equity markets

(Jan. 2007 – Nov. 2009; percentage)



Source: Bloomberg.

Note: The spot implied volatility index represents the VIX index, and the future series show the expected future levels of spot volatility (and related premia) as implied by futures contracts written on the VIX index.

economic activity. In this regard, futures on the VIX index over longer horizons suggest that stock market uncertainty has decreased to pre-Lehman Brothers levels, although it remains higher than the pre-turmoil levels of July 2007 (see Chart 1.14).

However, the equity market rebound remains exposed to the risk of a possible revision of the optimistic scenario. In particular, earnings expectations may be revised downwards, impacting negatively on market sentiment. The termination of credit support initiatives in the near future risks an adverse impact on corporate financing conditions, their earnings and stock prices.

### EMERGING FINANCIAL MARKETS

Improving economic prospects in emerging economies and a revival of risk appetite have led to an increase in demand for emerging financial assets. As a result, asset valuations have risen significantly, especially from the second quarter onwards. Since the data cut-off date for the June 2009 FSR, emerging

market equity valuations have gained about 24% (see Chart S39). The Emerging Market Bond Index Global (EMBIG) spread narrowed by 140 basis points, while yields on long-term domestic currency bonds have risen by around 25 basis points. By contrast, changes in most emerging market currencies have been modest in effective terms since the last FSR, due to their appreciation against the US dollar and depreciation against the other major currencies.

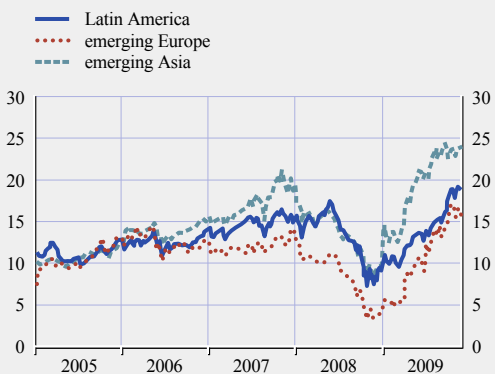
Emerging market asset prices have more than fully recovered in comparison with the levels prior to the collapse of Lehman Brothers. By end-November, for instance, the MSCI emerging market equity index was around 16% higher than its pre-Lehman level. Moreover, in contrast to the June 2009 FSR – in which evidence of an indiscriminate selling of emerging market assets was highlighted – there has been a recovery in emerging market asset prices. While stock valuations in emerging Asia and emerging Latin America are around 21% higher than their pre-Lehman levels, emerging Europe's stock prices are around 9% lower than their pre-Lehman levels.

The extent and speed of the recovery that has taken place, mainly in emerging equity markets, raises concerns about a possible build up of asset bubbles. By comparing the current valuation level to the historical levels, it can be seen that, by the end of November, the level of the P/E ratio for emerging Asia had already exceeded the earlier peak of October 2007 by a clear margin (see Chart 1.15).

Looking ahead, a major risk confronting emerging financial markets is the build up of future asset price bubbles, especially in countries such as China, where abundant liquidity conditions have played an important role in driving up asset prices. A further risk is that the recovery in asset prices that has taken place since the spring of 2009 could be quickly reversed if the recovery in the global economy were to be delayed or if the macroeconomic risks outlined in Section 1.1 were to materialise. Moreover, in some cases, the removal of monetary stimuli could also adversely impact asset prices. Emerging financial markets thus remain vulnerable to the possibility of capital outflows and a significant retrenchment of asset prices.

**Chart 1.15 Price/earnings ratios for selected equity markets in emerging market economies**

(Jan. 2005 – Nov. 2009)



Sources: MSCI and Bloomberg.  
Note: The price/earnings (P/E) ratio is calculated on the basis of current earnings. Overall, emerging financial markets remain a non-negligible source of market risk for euro area financial institutions.

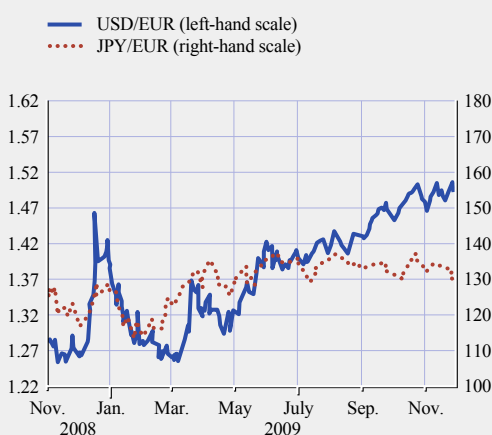
## FOREIGN EXCHANGE MARKETS

Between the end of May 2009 and the cut-off date for this edition of the FSR, the nominal effective exchange rate of the euro – as measured against the currencies of 21 of the euro area's important trading partners – appreciated by 2%. The appreciation mainly reflected the strengthening of the euro vis-à-vis the US dollar, the pound sterling and the Chinese renminbi, which was only partially offset by a depreciation vis-à-vis the Japanese yen, the Swedish krona and the currencies of Hungary, Poland and the Czech Republic.

After a period of stability in June 2009, the euro appreciated against the US dollar (see Chart 1.16). As the tensions in financial markets continued to ease and risk aversion decreased, the euro reportedly benefited

Chart 1.16 Selected bilateral exchange rates

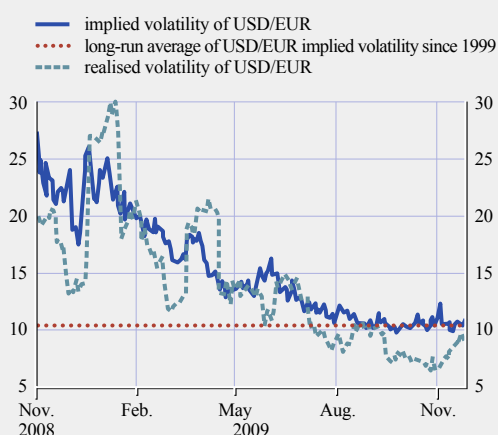
(Nov. 2008 – Nov. 2009)



Sources: Bloomberg and ECB calculations.

Chart 1.17 Implied and realised volatility of the EUR/USD exchange rate

(Nov. 2008 – Nov. 2009; percentage)



Sources: Bloomberg and ECB calculations.

from investors' diversification away from safe-haven currencies.

Since the end of August, the pace of the euro's appreciation vis-à-vis the US dollar has increased, possibly reflecting market concerns about the talks on the diversification of international reserves and the possible emergence of the use of the US dollar as a funding currency in carry-trade operations. Once tensions in foreign exchange markets eased, as evident from the return of options' implied volatilities to historical averages, the swings among European currencies became smaller in amplitude.

After a sharp rebound in the first half of the year, possibly related to some improvement in the UK financial sector, the pound sterling depreciated slightly from mid-June. Since mid-October 2009, the depreciation has been corrected somewhat, amid concerns that monetary easing in that jurisdiction would not be reversed in the near term.

The euro exchange rates vis-à-vis the currencies of Hungary, Poland and the Czech Republic have depreciated since the end of May, in the wake of the increase in appetite for market risk. Since the end of the summer, however, the

rebound in these rates has lost momentum and has been partially reversed.

While short-term volatilities have in many cases returned to their historical averages (see Chart 1.17), longer-term implied volatilities have remained persistently above these levels. In November, the gap between the one-year and one-month implied volatilities widened further. The resulting steepness of the volatility curve suggests that concerns remain regarding the currently low level of risk aversion in foreign exchange markets.

### 1.3 CONDITION OF GLOBAL FINANCIAL INSTITUTIONS

#### GLOBAL LARGE AND COMPLEX BANKING GROUPS<sup>1</sup>

##### Financial performance of global large and complex banking groups

The condition of global large and complex banking groups (LCBGs) generally improved in

<sup>1</sup> For a discussion on how LCBGs are identified, see Box 10 in ECB, *Financial Stability Review*, December 2007. The institutions included in the analysis 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.

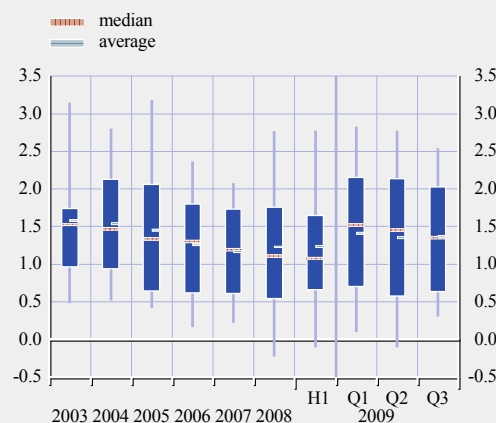
the second and third quarters of 2009, continuing a pattern that had emerged earlier in the year. Considerable increases in net income for some institutions resulted from better conditions for investment banking activities and strong returns from traditional commercial banking business lines, as net interest margins remained high. These broad developments reflect the level of state support made available in late 2008 – much of which was not put in place until early 2009 – and the improved profitability of banks. Despite improved sentiment regarding the condition of, and outlook for, many global LCBGs, and the improvements in net incomes in 2009, there were further write-downs on structured products and loans – across the spectrum of credit card loans, residential mortgages and commercial mortgages – all of which continued to climb. The sector remained dependent on government support, although some institutions, particularly in the United States, sought to exit from support measures.

Positive news on net after-tax incomes in 2009 was largely responsible for improved sentiment in the sector. It is clear, however, that the fortunes of global LCBGs, in this and many other respects, are diverging. On the one hand, banks with substantial investment banking operations have benefited substantially from the pick-up in activity in the capital markets. Others, however, who have fallen back on traditional, more conservative business lines, have posted more modest performances. Losses were reported by several institutions, however, during the course of the year.

The divergence of the recent financial results of global LCBGs complicates any analysis of the underlying drivers of profitability.<sup>2</sup> In the euro area, net interest income has been one of the key drivers of profitability for LCBGs, as high net interest margins have resulted from a steep yield curve and depressed competitive forces (see Section 4.1). In the case of global LCBGs, however, average net interest income was unchanged in the first half of the year when

**Chart 1.18 Net interest income of global large and complex banking groups**

(2003 – Q3 2009; percentage of total assets; maximum, minimum and inter-quartile distribution)



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

Note: Quarterly incomes based on available data.

compared to 2008, but remained around levels recorded in 2006 (see Chart 1.18). Dispersion within the sample also remained wide. Quarterly data, which excludes those banks that do not report at this frequency, offers a somewhat different perspective.<sup>3</sup> Both average and median net interest income improved considerably in 2009 and, in the case of the latter, reached levels last seen between 2003 and 2005.

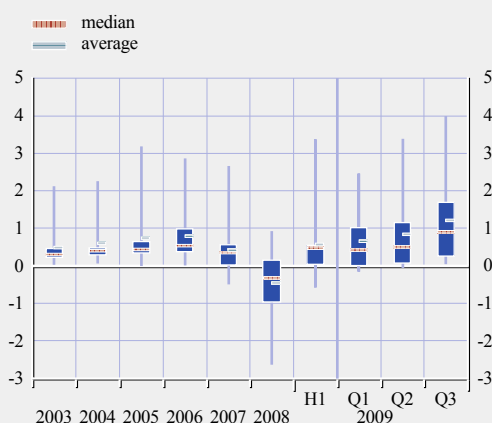
Expressed as a ratio of total assets, fee and commission incomes have edged upwards slightly over the year on the basis of data available at the quarterly frequency. A clear reversal of the trend that began in 2007, however, can be observed for trading incomes (see Chart 1.19); from the outright losses recorded in 2008, average trading income for the third quarter, expressed as a percentage of total assets, now lies at around 1.2%; both

2 Further complications in this regard arise from the consolidation that has taken place within the sample of banks and differences in the frequency of the publication of financial reports.

3 The quarterly sample includes those LCBGs that are based in Switzerland and the United States. LCBGs based in the United Kingdom report at a semi-annual frequency.

**Chart 1.19 Trading revenues of global large and complex banking groups**

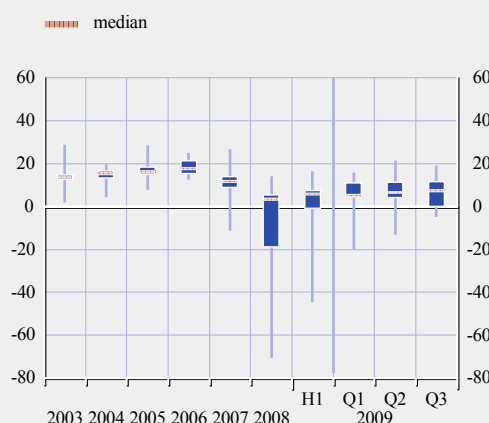
(2003 – Q3 2009; percentage of total assets; maximum, minimum and inter-quartile distribution)



Sources: Individual institutions' financial reports, Bloomberg and ECB calculations.  
 Note: Quarterly revenues based on available data.

**Chart 1.20 Return on equity for global large and complex banking groups**

(2003 – Q3 2009; percentage; maximum, minimum and inter-quartile distribution)



Sources: Individual institutions' financial reports, Bloomberg and ECB calculations.  
 Note: Quarterly revenues based on available data.

average and median trading income improved over the last two quarters in comparison with first-quarter results.<sup>4,5</sup> While this clearly reflects the recovery in financial markets, the ongoing and significant rebound might also be attributed to an increase in risk-taking. Indeed, using available data, just one global LCBG reported a trading book value-at-risk (VaR) for the second quarter of 2009 that was below 2007 levels.<sup>6</sup> A general trend appears to be that VaR levels remain at or above those recorded in the last quarter of 2008, albeit lower than in the first quarter of this year in some cases.

The profitability of global LCBGs rose in the first half of 2009, as measured by the return on equity (ROE) (see Chart 1.20). Median ROE rose to 5.79% from 3.36% in 2008 and the dispersion of returns was much reduced. Quarterly data reveal that the ROE recovered further in the third quarter, to reach 7.32%.<sup>7</sup> The general improvement in the absolute level and dispersion of the ROE occurred despite a general increase in shareholders' equity across the sample, which had the effect of generally reducing the ROE.<sup>8</sup> The return on assets (ROA), an alternative measure of profitability that

strips out the effect of changes in leverage, declined in the third quarter, albeit slightly. Excluding significant outliers, average ROA fell to around 0.5% in the third quarter, down from 0.59% in the second quarter of the year, on the basis of data available at that frequency. The results for the third quarter are an improvement on 2008 levels but remain considerably below historical norms.

### Solvency positions of global large and complex banking groups

Leverage among global LCBGs, as measured by the ratio of shareholder equity to total assets, declined slightly in the second and third quarters of this year and some reduction was also observed

4 These results and Chart 1.2 are based on the identification and exclusion of one significant outlier in the third quarter. Results for the complete sample can be found in Table S2 of the Statistical Annex.

5 In general, this trend cannot be attributed to a base effect arising from changes in total assets.

6 Data refers to ten-day value-at-risk on trading portfolios with a 99% confidence level.

7 These results and Chart 1.3 are based on the identification and exclusion of one significant outlier in each of the second and third quarters. Results for the complete sample can be found in Table S2 of the Statistical Annex.

8 In the United States, for instance, a number of banks, including Morgan Stanley, Bank of America and JP Morgan Chase & Co., issued equity with a view to repaying TARP funds.

in the inter-quartile range. Developments were disparate across banks and regions, however, and resulted, to some extent, from both equity-raising activities and the shedding of assets (for further details, see Box 4).

Average Tier 1 capital ratios remained well in excess of regulatory minima and were broadly unchanged in the first half of the year (see Chart 1.21). Underlying this trend, however, were diverging movements that can be seen in the rising median and compressed dispersion of the ratios. Several US banks reduced their capital ratios from 2008 levels, with notable exceptions including Citigroup and Bank of America. Swiss banks, however, generally increased their ratios, as did UK banks, although from relatively low levels (typically below 9%) in the latter case.<sup>9</sup> These diverging trends may highlight the significant impact of the US stress-testing exercise, conducted earlier in 2009, in relieving pressure on US institutions, or result from a process of normalisation. Nevertheless, both semi-annual and quarterly data – the latter of which excludes UK-based LCBGs who typically report the lowest ratios of

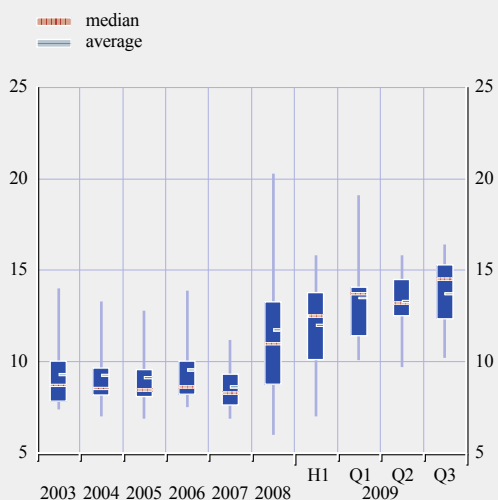
the sample – indicate that capital ratios remain at robust levels. Following a trend outlined in the previous edition of the FSR, global LCBGs, along with their euro area counterparts, have continued to buy back their own debt at steep discounts. This activity has further improved the capital positions of some institutions.

Government support measures also continued to bolster the capital and funding positions of many global LCBGs. Recourse to support generally declined after June 2009, but outstanding measures nonetheless remained significant, and continued to support the shock-absorbing capacities of LCBGs. Recent months, however, have seen a growing trend towards an exit from support programmes, particularly in the United States, where many institutions have repaid funds made available under the TARP. There has also been an increase in the issuance of non-guaranteed bonds as market conditions improved. In the United Kingdom, both Lloyds Banking Group and Royal Bank of Scotland received further capital injections from the government, as both banks were restructured following a ruling by the European Commission concerning state aid. Lloyds Banking Group also negotiated an exit from the asset protection scheme. In the United States, the scheme to protect impaired legacy assets, the Public-Private Investment Program, finally moved towards implementation in September 2009.<sup>10</sup>

These developments, which mirror those outlined in previous paragraphs, have highlighted the rift that is emerging among global LCBGs, between those with reasonably high net incomes that are no longer explicitly reliant on government support, on the one hand, and those with more modest or even negative incomes for whom government support remains

**Chart 1.21 Tier 1 capital ratios for global large and complex banking groups**

(2003 – Q3 2009; percentage; maximum, minimum and inter-quartile distribution)



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

<sup>9</sup> A notable exception here was Royal Bank of Scotland. Its Tier 1 capital ratio fell to 7% in the first half of the year, from 10% in 2008, following significant write-downs on mortgages and other credit-related assets.

<sup>10</sup> By early November, seven funds had raised a total of USD 16.4 billion in equity and debt capital from private investors (USD 4.1 billion) and the US Treasury (USD 12.3 billion) to buy impaired legacy assets. The US Treasury has committed up to USD 30 billion to the scheme.

important, on the other. A further shock in financial markets or a reassessment of the likely recovery path of the global economy could reveal vulnerabilities in those institutions that have hurriedly relieved themselves of sovereign support. Furthermore, given the apparent rift in the sample, plans to unwind support measures must give serious consideration to the condition of those banks that are most reliant on them.

#### Outlook for global large and complex banking groups on the basis of market indicators

Share prices of global LCBGs generally continued to rise in the second and third quarters of 2009, although developments were disparate (see Charts 1.22 and S12). The general improvement in financial markets, the perceived impact of government support measures and stimulus packages, and the positive news regarding financial sector performance have all supported stock prices.

The same trends were clear in credit default swap (CDS) spreads, which continued to diminish for global LCBGs (see Charts 1.22

and S13). The spreads for banks receiving the most significant government support, however, remained relatively high, despite significant drops over recent months. These developments were generally mirrored in the measures of default probability and distance to default (see Charts S10 and S11).

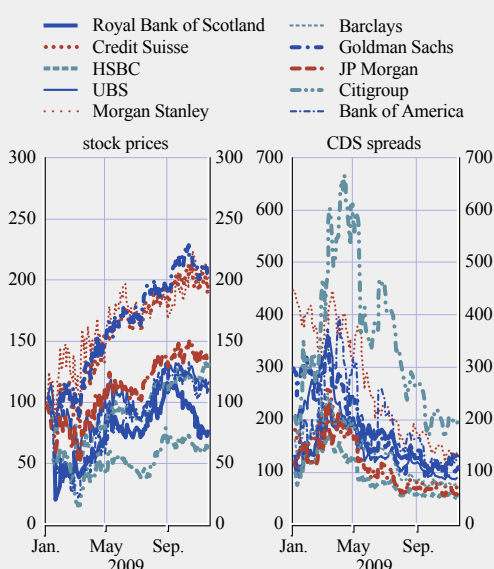
#### Outlook and risks for global large and complex banking groups

Despite improvements in their net income and capital positions, and a reduced reliance on sovereign support, the outlook for global LCBGs remains highly uncertain and continues to entail considerable risks. With current earnings generally being driven by the troika of high net interest margins, rebounding financial markets and, to some extent, buoyant incomes from capital market activities, potential earnings are susceptible to a flattening of the yield curve and a further bout of escalated financial market stresses. Furthermore, write-downs expected for the coming quarters remain high and may possibly increase further in some regions.<sup>11</sup> Two particular areas of concern are commercial property and consumer lending. In the United States, increasing defaults on credit card lending have been identified as a source of considerable risk.<sup>12</sup> These concerns, however, have generally been reflected in banks' loan-loss provisioning rates.

For banks based in the United Kingdom and the United States, much will depend on the pace of economic recovery, on developments in property prices, both residential and commercial, and on the level of unemployment. Macroeconomic

**Chart 1.22 Stock prices and CDS spreads of a sample of global large and complex banking groups**

(Jan. 2009 – Nov. 2009; stock price index: Jan. 2009 = 100; spreads in basis points; senior debt, five-year maturity)



Sources: Bloomberg and ECB calculations.

<sup>11</sup> In recent months, for example, the rating agencies Standard & Poor's and Moody's have postulated that UK banks will face further loan losses of GBP 97 billion and GBP 130 billion respectively. In the former case, losses were forecast to peak in 2010, and loss estimates related to domestic loans only. Non-performing loans for US banks with total assets in excess of USD 20 billion reached close to an annualised level of 5% in the second quarter, followed closely by net loan write-offs, which exceeded 2.5% of total loans in that quarter.

<sup>12</sup> In the United States, seasonally adjusted credit card delinquency rates declined slightly to 6.6% in the third quarter, from 6.7% in the second quarter, which was a record high level. Write-off rates, however, continued to climb, reaching a historical high of 10.2% in the third quarter, up from 9.6% and 7.5% in the first and second quarters of the year respectively.

developments will have a significant impact on the outlook for write-downs on loans. Despite efforts to cut costs and delever, and

notwithstanding the banks' relatively strong capital positions, the remaining shock-absorption capacity of global LCBGs remains uncertain.

#### Box 4

##### DELEVERAGING VIA A DECLINE IN INTERNATIONAL BANK LENDING DURING THE GLOBAL TURMOIL

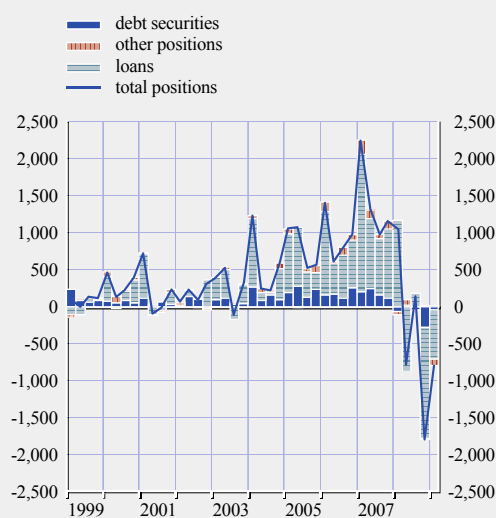
Financial globalisation has been an important feature of the world economy over the past decade. International financial claims showed a strong upward trend, rising from approximately USD 10 trillion in the first quarter of 1999 to USD 35 trillion in the second quarter of 2008. As the recent financial turmoil took hold of the world economy, financial institutions responded to capital shortages by cutting their lending and selling other assets to reduce the size of their balance sheet, a process known as deleveraging. Equally important was a home-bias effect in an environment of high uncertainty regarding the credit quality of banks on a global scale.

This box examines the international dimension of this process, i.e. how the banking sector reduced its international financial claims vis-à-vis banks and other borrowers by unprecedented amounts during the most severe phases of the global turmoil. International financial claims fell particularly significantly in the fourth quarter of 2008, namely by USD 1.8 trillion at constant exchange rates (see Chart A), and then declined at a more moderate pace in the first quarter of 2009. In terms of composition, banks delevered primarily international loans, while the impact was smaller on their holdings of debt securities and on their other positions.

The impact of the deleveraging process of international banks affected all world regions. Foreign claims of BIS reporting countries vis-à-vis the United States and the United Kingdom were reduced by USD 1 trillion and USD 940 billion respectively between March 2008 and March 2009 (see Chart B). A sizeable reduction was also observed vis-à-vis several euro area countries, partly reflecting a fall in intra-euro area financial claims. International banks also reduced their exposure to emerging market countries by half a trillion dollars (more than USD 200 billion of this retrenchment stemmed from euro area banks). There is evidence, however, of a considerable degree of stabilisation across all major destinations in the first quarter of 2009 and, according to provisional data, in the second quarter of 2009, suggesting that major tensions in the banking sector are gradually easing.

**Chart A International financial claims by type of instrument**

(Q1 1999 – 2009 Q1; USD billions at constant exchange rates)



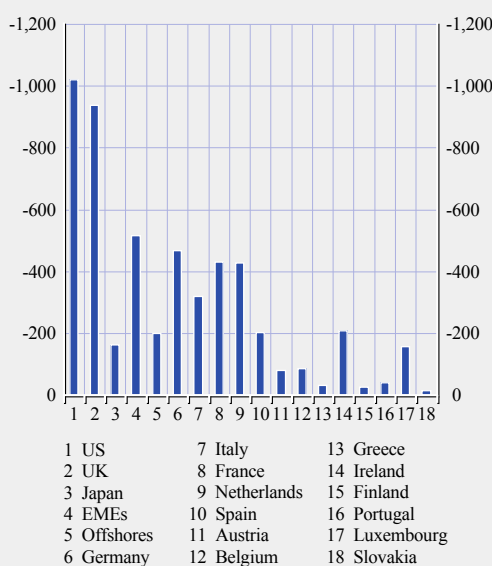
Sources: BIS and ECB calculations.  
Note: Locational data, based on the resident principle.

The global economy is, however, unlikely to witness soon a return to pre-crisis rates of expansion in cross-border activity.

The process of bank deleveraging that was witnessed at the end of 2008, followed by a phase of stabilisation in the first half of 2009, could be viewed as a necessary adjustment of loan-to-deposit ratios, after several years of excessive expansion in global liquidity. However, a prolonged period of subdued cross-border activity could also signal a phase of generalised weakness in the banking sector for two reasons: first, its resilience could be reduced through lower international fragmentation and, consequently, deleveraging may limit the banking sector's ability to facilitate international risk sharing. Until such time as their capital position is sufficiently strengthened, this may have some impact on the banks' willingness to lend, and thus on the pace of the global recovery.

**Chart B Change in foreign claims of BIS reporting countries vis-à-vis major counterparties**

(Mar. 2008 – Mar. 2009; USD billions and ultimate risk basis)



Sources: BIS and ECB calculations.  
Note: Consolidated data, based on headquarter principle.

## HEDGE FUNDS

At the end of October 2009, the cumulative average year-to-date investment returns of all hedge fund investment strategies had the opposite signs to those reported for the whole of 2008 (see Chart 1.23). Moreover, most hedge fund investment strategies had recouped a substantial part, or even all, of the losses they had suffered in turbulent 2008. The fact that in 2009 many hedge funds still remained below their high watermarks (i.e. previous investment performance peaks), and could thus not charge incentive fees, has also contributed to this impressive recovery in standard net-of-all-fees returns.

### Redemptions

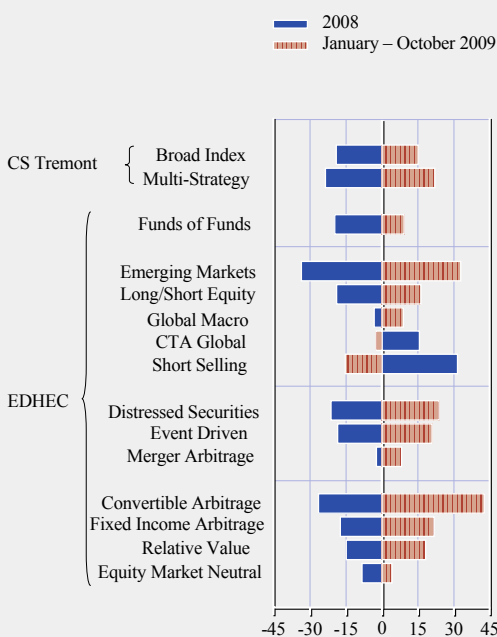
Strong average investment performances, however, have so far not led to a reversal of investors' outflows, which were, nevertheless, far less negative in the second quarter of 2009 than in the first (see Chart S15). In addition, some preliminary data suggested that the second quarter of 2009 may mark the end of

sector-wide investor outflows. Given that many pension funds and other institutional investors have to rebalance their portfolios periodically in order to maintain their fixed percentage asset allocations, higher average hedge fund investment returns in 2008, as compared with those of major equity indices, increased the share of hedge funds in these portfolios. This could have prompted some investors to redeem more from hedge funds than they would have wanted if all other factors had been equal. Relative performances of indices have to some extent reversed in 2009, and this may no longer hinder the recovery of the hedge fund sector.

Higher asset prices and improved liquidity in most financial markets have allowed many hedge funds to restore their liquidity buffers and to lift remaining temporary redemption restrictions or suspensions, although the estimated share of pent-up capital under management still remained non-negligible at the end of the third quarter of 2009 (see Chart 1.24) and may result in further investor outflows.

**Chart 1.23 Global hedge fund returns**

(2008 and Jan. 2009 – Oct. 2009; percentage cumulative returns net of all fees; in USD)

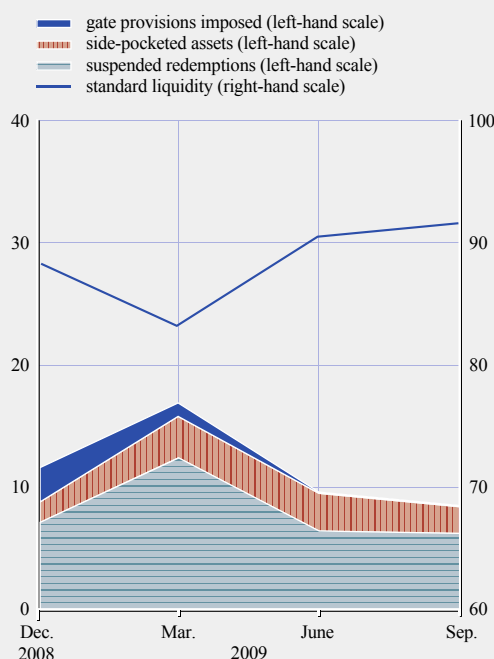


Sources: Bloomberg and EDHEC Risk and Asset Management Research Centre.

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 Global"; this investment strategy is also often referred to as managed futures.

**Chart 1.24 Hedge funds, broken down by the status of investor liquidity terms**

(Q4 2008 – Q3 2009; percentages of capital under management)



Sources: Credit Suisse/Tremont Hedge Fund Index and Bloomberg.

Notes: Based on a sample set of funds reflective of the Credit Suisse/Tremont Hedge Fund Index. Gate provisions limit withdrawals per redemption period as a proportion of the capital under management. Side-pocketing occurs when hedge funds segregate illiquid assets from liquid assets, and the former cannot be redeemed until they are sold.

The impact of various investor redemption restrictions was very evident in the secondary market for hedge fund stakes, as most transactions in 2009 were concluded at substantial discounts to funds' net asset value (NAV) per share (see Chart 1.25). According to the operator of one secondary trading platform, August was the first month in 2009 in which a transaction took place at the fund's NAV.<sup>13</sup> At a time when many hedge funds remain below their high watermarks and managers cannot charge incentive fees until their cumulative investment performance recovers past shortfalls, buyers in the secondary markets may also expect incentive-fee savings if the fund manager allows the transfer without a resetting of the high watermark.

More generally, the crisis prompted substantial reviews and the restructuring of investor redemption terms within the hedge fund sector, which should lead to a better match between the illiquidity/maturity of investments and liquidity offered to investors.

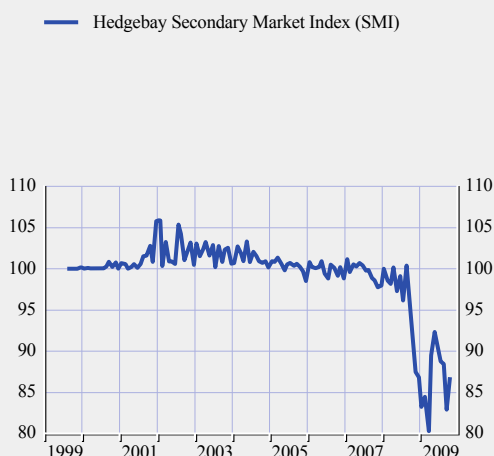
### Exposures and leverage

The recovery in financial markets has also led to some re-leveraging by hedge funds. However, leverage rose from very low levels, and it still appeared to be lower in mid-2009 than at the end of 2007

<sup>13</sup> See Hedgebay Trading Corporation, *The Hedgebay Chronicle*, August 2009.

**Chart 1.25 Average premium or discount to NAV per share paid for hedge fund stakes in the secondary market**

(Aug. 1999 – Oct. 2009)

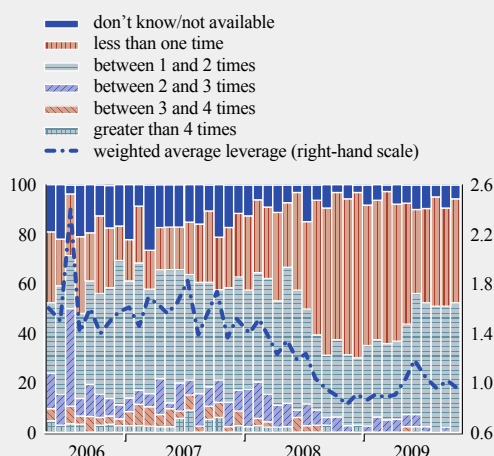


Source: Hedgebay Trading Corporation.

Note: The Hedgebay SMI is an asset-weighted index that describes the average premium or discount paid for hedge fund stakes that are traded via the Hedgebay platform in the secondary market in any given month.

**Chart 1.27 Hedge fund leverage**

(May 2006 – Oct. 2009; percentage of responses and weighted average leverage)

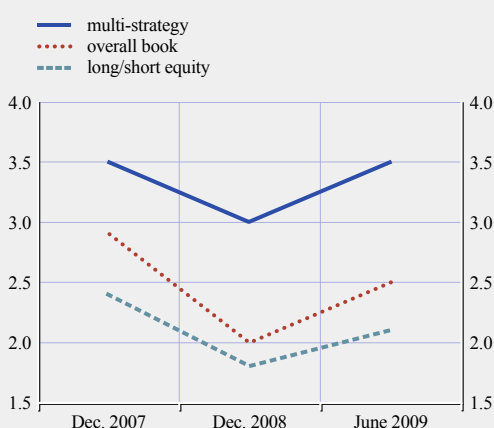


Source: Bank of America Merrill Lynch, *Global Fund Manager Survey*.

Notes: Leverage is defined as a ratio of gross assets to capital. In 2008 and 2009, the number of responses varied from 32 to 45.

**Chart 1.26 Hedge fund leverage based on assets held at a prime broker**

(gross long and short market exposure relative to equity in a prime brokerage account)



Source: Man Investments (based on Credit Suisse prime brokerage client base).

Notes: This measure of leverage refers only to assets held by Credit Suisse as a prime broker, and thus does not reflect hedge fund clients' total leverage, which may deviate from this. The leverage of 2.5 for the overall book indicates that for every USD 100 of equity, hedge fund clients have USD 250 of gross market value exposure (long and short).

(see Charts 1.26 and 1.27). The expectation expressed in the June 2009 FSR that the average level of leverage in the hedge fund sector had bottomed out and could start to increase as soon as financial markets recovered appears to have materialised. The haircuts on collateral assets, as well as other credit terms applied by creditor banks, seem to have stabilised, thereby implying lower funding liquidity risk for hedge fund clients. Nevertheless, financing maturities remained very short-term (see also Section 4.2).

The still high hedge fund liquidation rate, the lower levels of employed leverage and the reduced total capital under management (i.e. net assets) have also substantially diminished hedge funds' total gross assets, contributing to a decline in their share of total trading volumes.<sup>14</sup>

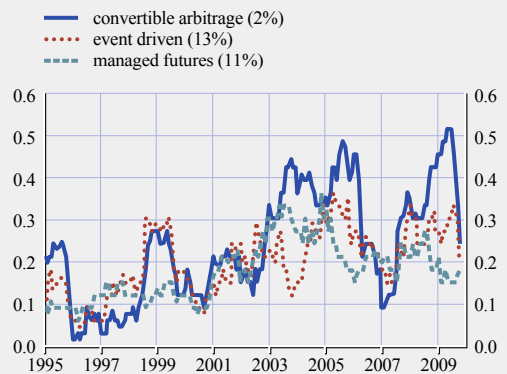
<sup>14</sup> See Greenwich Associates, "US Fixed-Income: Sharp Drop in Hedge Fund Trading Volume", press release of 1 September 2009; and Financial Times, "Hedge fund influence curtailed", 21 September 2009.

This, however, may have led to lower competition among hedge funds and to more opportunities for profitable investment. Consequently, moving median pair-wise correlation coefficients of the returns of hedge funds within broadly defined investment strategies suggest that the similarity of hedge funds' investment positioning and the resulting risk of collective exits from crowded trades has declined somewhat, but not within all investment strategies (see developments within selected investment strategies in Chart 1.28).

All in all, funding liquidity pressures and the associated risk of forced asset sales seem to have abated in the hedge fund sector. Nonetheless, sustaining currently strong investment performances will be crucial in the period ahead, not least for the sector's longer-term prospects.

**Chart 1.28 Medians of pair-wise correlation coefficients of monthly global hedge fund returns within strategies**

(Jan. 2005 – Oct. 2009; Kendall's  $\tau_b$  correlation coefficient; monthly returns, net of all fees, in USD; moving 12-month window)



Sources: Lipper TASS database, Lipper TASS and ECB calculations.

Note: The figures given in brackets behind the strategy designations indicate the share of total capital under management (excluding funds of hedge funds) at the end of June 2009, as reported by Lipper TASS.

## 2 THE EURO AREA ENVIRONMENT

*The overall macroeconomic environment in the euro area has improved over the past six months, albeit with considerable heterogeneity at the country level. At the same time, sizable vulnerabilities in the corporate and household sectors remain and the outlook for both sectors continues to be uncertain and strongly dependent on the recovery of the economy evolving in line with expectations. In particular, the profitability of companies has remained very low and leverage ratios have generally increased, while financing constraints persist. As a result, overall balance sheet conditions are expected to remain challenging. Euro area commercial property markets were already in a fragile state six months ago and deteriorated further during the past six months, adding to the balance sheet vulnerabilities of the non-financial corporate sector. As for the household sector, while deteriorating labour market conditions have contributed to highlighting vulnerabilities, macroeconomic outcomes have been better than those expected six months ago. Moreover, the improving macroeconomic outlook, may contribute to mitigating some risks stemming from the household and corporate sectors going forward. That said, considerable uncertainty remains, not least in view of the unprecedented severity of the recent downturn in activity.*

### 2.1 ECONOMIC OUTLOOK AND RISKS

The overall macroeconomic environment in the euro area has improved since the finalisation of the June 2009 Financial Stability Review (FSR). Amid signs of an ongoing improvement of economic activity, the euro area is benefiting from the inventory cycle, a recovery in exports, the significant macroeconomic stimulus under way and the measures taken to restore the functioning of the financial system. That said, uncertainty remains high and the volatility of incoming data warrants a cautious interpretation. Moreover, there remains considerable heterogeneity in economic developments at the country level.

Looking ahead, the recovery is expected to remain rather uneven, supported by a number of temporary factors in the short term, but likely to be affected over the medium term by the process of ongoing balance sheet adjustment in the financial and the non-financial sectors of the economy, both inside and outside the euro area. The December 2009 Eurosystem staff macroeconomic projections for the euro area place annual real GDP growth in a range of -4.1% to -3.9% in 2009, 0.1% to 1.5% in 2010 and 0.2% to 2.2% in 2011.<sup>1</sup> Many private sector forecasters have also been revising their predictions for euro area real GDP growth for 2010 and 2011 upwards in recent months. Notwithstanding this, uncertainty has remained high: despite having fallen from historical highs since early this year, the standard deviation across private sector GDP forecasts for major advanced economies has remained elevated compared with historical norms.

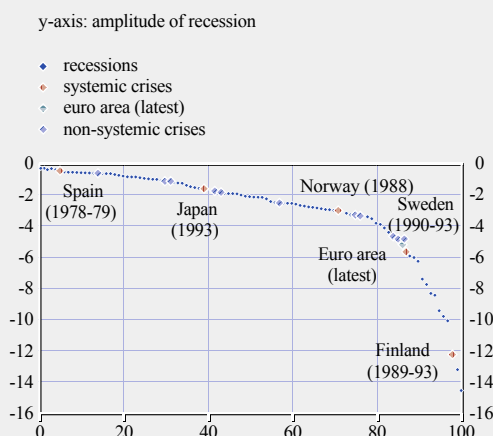
Overall, the risks to the macroeconomic outlook remain broadly balanced. On the upside, the effects stemming from the extensive macroeconomic stimulus being provided, as well as from other policy measures taken, may be stronger than anticipated. By the same token, confidence may improve further, while foreign trade may recover more strongly than expected. On the downside, concerns remain with respect to a stronger or more protracted negative feedback loop between the real economy and the financial system, as well as regarding renewed increases in oil and other commodity prices, the intensification of protectionist pressures and the possibility of disruptive market movements related to the correction of global imbalances.

The signs of improvement in the macro-financial economic environment in the euro area, apparent since the finalisation of the previous FSR, could help contribute to a possible partial abatement of some risks to financial stability. The

<sup>1</sup> The December 2009 Eurosystem staff macroeconomic projections were published on 3 December 2009, after the cut-off date for this issue of the FSR.

**Chart 2.1 Amplitude of the latest euro area recession in a historical context**

(ordinal ranking of amplitude (0 = smallest, 100 = strongest))



Sources: OECD, Eurostat and ECB calculations.  
Notes: Includes OECD recessions since 1970, as well as crisis episodes outlined in Chapter 3 of the IMF April 2009 World Economic Outlook. Specifically, systemic crises are defined as the “big 5” financial crises in OECD countries since 1970 which occurred in Spain (1978-79), Finland (1989-93), Sweden (1990-93), Norway (1988), and Japan (1993) – while non-systemic crises are the other financial crises in selected OECD countries over the period.

materialisation of an expected deterioration in labour market conditions, however, highlights vulnerabilities for the household sector. Moreover, while the improvements relative to expectations six months ago may, to some extent, contribute to mitigating some risks stemming from the household and corporate sectors going forward, the severity of the recession by historical standards (see Chart 2.1) and the expected phasing-out of government support measures, along with high uncertainty regarding the economic outlook, imply continued risks to financial stability stemming from the macroeconomy. In such a context, there may yet be further credit losses for banks stemming from adverse macro-financial feedback loops.

## 2.2 BALANCE SHEET CONDITION OF NON-FINANCIAL CORPORATIONS

Since the finalisation of the June 2009 issue of the FSR, the already difficult operating environment confronting euro area firms deteriorated somewhat further, notwithstanding better than expected macroeconomic outcomes.

In particular, over the past six months, the profitability of large non-financial companies has declined and leverage ratios have generally increased, intensifying pre-existing balance sheet vulnerabilities of the non-financial corporate sector. In addition, banks have continued to apply conservative lending standards towards firms. Some relief, however, came from improvements in financial market conditions, which allowed firms to partly replace bank loans with market-based debt or equity.

Looking forward over the next few months, the overall balance sheet condition of the euro area non-financial corporate sector is expected to remain challenging. This assessment is based on the expectation that firms’ access to external finance is not likely to improve significantly in the coming months, while profitability may also remain low: weak profits, high leverage and firms’ dependence on bank finance are currently the key vulnerabilities in the corporate sector. This means that default rates are likely to remain elevated for some time to come. That said, improvements in the macroeconomic outlook should contribute to mitigating some of the risks stemming from the corporate sector going forward. Hence, in the course of next year, firms’ balance sheet conditions are expected to begin to recover as a result of better economic growth prospects.

## OUTLOOK FOR CORPORATE SECTOR CREDITWORTHINESS

A closer look at firms’ profitability and leverage helps to explain the recent deterioration in corporate sector creditworthiness. Following a sharp deterioration in profits in the fourth quarter of 2008 and in the first quarter of 2009, the earnings per share of euro area firms declined further in the second and third quarters (see Chart S52). The low profitability of firms has hampered their ability to generate internal funding. At the same time, their leverage ratios, which had already been high, continued to rise, although this was more because of declines in the values of the denominators used to compute these ratios (see Chart S51).

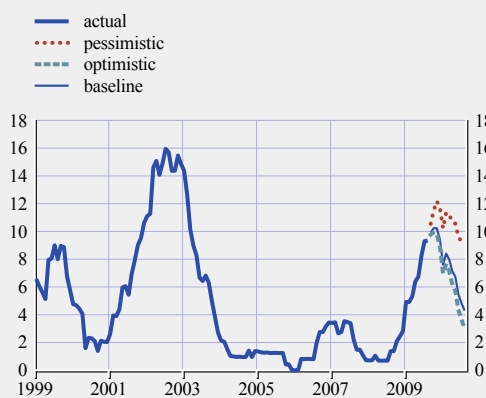
Looking ahead, a recovery in profitability is expected by analysts of non-financial firms (see Chart S52). This partly relates to the easing of monetary policy and its effective pass-through, which has brought some relief for firms by reducing their real financing costs and by lowering the interest burden. However, the improvement in profitability may not be sufficient to bring about material improvements in their leverage ratios, leaving them vulnerable to adverse disturbances. At the same time, the corporate sector continues to face risks relating to persistently tight financing conditions, which may limit their access to external funding sources and hamper their ability to refinance existing debt (see Box 5).

The deterioration in euro area corporate sector balance sheet conditions has translated into a significant increase in the number of defaults by euro area firms, in particular in the non-investment-grade sector. Since October 2008, default rates for the European speculative-grade sector have increased sharply from a level of less than 1% to a level of more than 9% in October 2009 (see Chart 2.2). While Moody's latest model-based forecasts show a more optimistic outlook for speculative-grade default rates than was the case six months ago, they are still predicting that default rates will increase slightly further by December 2009 and will then start to decrease. During the last credit cycle downturn in 2002, real GDP remained positive (see Chart S43), but the speculative-grade default rate reached a level of just below 16%. Hence, considering the severity of recent business cycle developments in the euro area, there is a possibility that these forecasts could turn out to be rather optimistic.

Market expectations concerning defaults have also improved considerably over the past six months. Credit default swap (CDS) spreads and corporate bond spreads have narrowed substantially across all rating classes and corporate bond spreads of investment-grade companies have fallen back close to pre-crisis levels (see Chart S81). For companies in the

**Chart 2.2 Actual and forecast default rates of European speculative-grade corporations**

(Jan. 1999 – Oct. 2010; percentage; 12-month trailing sum)



Source: Moody's.

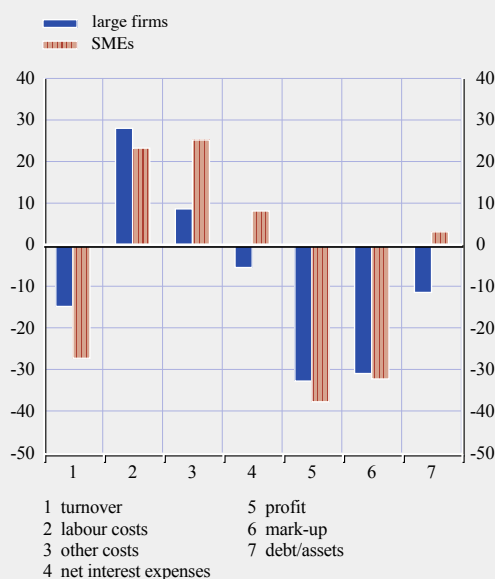
speculative-grade segment, spreads have decreased as well, but they still remained sizeable, indicating that concerns about these firms' creditworthiness remained heightened (see Chart S82).

While a decrease in expected default rates has been observed across most industries, absolute levels of default rates across industries remain much higher than before the crisis. This is particularly true for cyclical industries, such as construction or technology. Owing to government support measures, companies in the automobile sector have continued to be able to withstand the recession relatively well throughout 2009; however, with the phasing-out of incentive schemes, bankruptcies could still increase. In addition to car-makers, smaller and medium-sized suppliers in the automobile sector may also come under severe pressure since they are often tied to one specific car-maker, making them heavily dependent on the healthiness of that company.

While the financial turmoil initially affected primarily large firms, there are some indications that, with the intensification of the crisis, small and medium-sized companies may have been more strongly affected than large companies. In

**Chart 2.3 Effect of the economic downturn on large companies and small and medium-sized companies**

(H1 2009; net percentage of firms reporting an increase)



Source: ECB-EC SME survey.

Notes: The net percentage of firms reporting an increase in a given item is calculated as the difference between the percentage of reported "increases" and the percentage of reported "decreases". A positive value indicates that there are more companies reporting an increase in the respective item than companies reporting a decrease.

particular, according to the first euro area survey on SMEs<sup>2</sup>, the percentage of small and medium-sized companies reporting unfavourable developments in turnover, profits and leverage over the first half of 2009 was somewhat higher than the respective percentage of large companies (see Chart 2.3).

The sector and firm size-specific risks identified here could imply challenges for smaller banks in the period ahead. This is because small banks tend to lend, to a large extent, to small and medium-sized companies.<sup>3</sup> In addition, small banks are often regionally focused and thus less diversified across industries than large banks, making them more vulnerable to adverse disturbances in individual industries.

2 See ECB, *Survey on the access to finance of small and medium-sized enterprises in the euro area*, September 2009. The survey was conducted in cooperation with the European Commission.

3 A number of studies have found that large banks allocate a much lower proportion of their assets to small business loans than do small banks (see e.g. A.N. Berger and G.F. Udell, "Relationship lending and lines of credit in small firm finance", *Journal of Business*, No 68, 1995; and P.E. Strahan and J. Weston, "Small business lending and bank consolidation: is there cause for concern?", *Current Issues in Economics and Finance*, No 2, Federal Reserve Bank of New York, 1996).

## Box 5

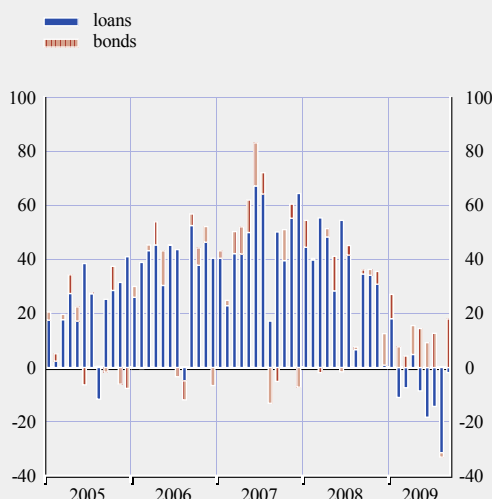
### ACCESS TO FINANCE FOR NON-FINANCIAL CORPORATIONS IN THE EURO AREA

Since profitability and thus the ability of firms to generate internal funding have remained very low, or even deteriorated, non-financial corporations may become heavily dependent on external financing. In this context, constraints in firms' access to external finance could increase firms' solvency and liquidity risks, triggering an increase in corporate defaults and putting additional pressure on the profitability of the banking system. Against this background, this box examines how the availability of financing resources for non-financial corporations has developed since the previous issue of the FSR. It finds that, for larger companies, access to external finance has improved slightly, but that, for both large and small firms, conditions remain tight.

Bank loans are traditionally the most important source of external finance for European companies. According to the results of the latest bank lending survey, in the third quarter of 2009, banks tightened the lending standards applied to loans and credit lines to enterprises for the fifth quarter in a row, but there are also clear indications that the process of tightening lending standards is coming to an end.

**Chart A Net flows of loans and bond issuance  
by euro area non-financial corporations**

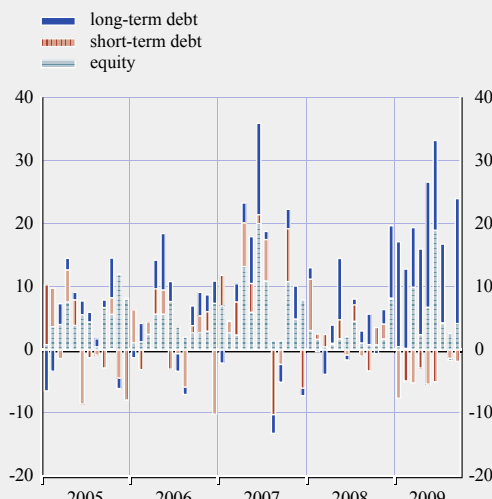
(Jan. 2005 – Sep. 2009; EUR billions)



Source: ECB.

**Chart B Issuance of debt and equity  
by euro area non-financial corporations**

(Jan. 2005 – Sep. 2009; EUR billions)



Source: ECB.

Note: Issuance of debt refers to net issuance.

While the continued reports of tightening credit standards may raise concerns, it should be remembered that banks often apply very lax credit standards in booms, meaning that a certain level of tightening may be justified to achieve lending standards fully reflecting borrowers' riskiness.<sup>1</sup> Moreover, the decrease in bank lending to firms, which can be observed at the aggregate level, seems to be primarily a result of firms' lower demand for credit: the brisk deterioration in real economic activity and capital expenditure by non-financial corporations since the beginning of this year has been the main contributor to the sharp slowdown in overall lending business.

At the same time, the tightening of lending standards was also the consequence of increasing vulnerabilities in the banking system. However, largely as a result of the standard and non-standard monetary policy decisions, supply-side factors, such as capital costs of banks, banks' access to funding and banks' liquidity positions, have become less important over the last six months. Overall, the cumulated tightening of credit standards may have weighed somewhat on loan dynamics in 2009. Surveys among enterprises and recent empirical studies indicate that supply-side restrictions have indeed been relevant in the current crisis.<sup>2</sup>

Tighter financing conditions by banks have been partly offset by improvements in the availability of market-based financing, reflected in higher net bond issuance (see Chart A). As indicated by net issuance volumes, the maturity of debt has been predominantly long-term, reducing firms' dependence on financing from banks and financial markets in the coming years (see Chart B). Furthermore, the issuance of equity by non-financial corporations has also increased substantially. The rebound of capital markets and the significant decline in the costs

1 For pro-cyclical lending standards, see ECB, "Determinants of bank lending standards and the impact of the financial turmoil", *Financial Stability Review*, June 2009.

2 For the importance of demand-side and supply-side effects, see ECB, "Euro area bank lending survey – October 2009"; and ECB, "Monetary policy and loan supply in the euro area", *Monthly Bulletin*, October 2009, and the literature there cited.

of equity and debt made market-based finance more attractive. Both instruments play a role primarily for large companies.

In addition to market-based finance, inter-company loans and cross-holdings of unquoted shares among non-financial corporations also compensated, to some extent, for the tightening of bank credit standards (according to data from integrated euro area accounts). These instruments may be relevant, in particular, for companies belonging to a conglomerate, and therefore also predominantly for larger companies.

Considered together, the findings indicate that firms' access to external finance may have improved somewhat, at least for large companies. Small and medium-sized companies are more likely to be facing constraints in their financing needs, which is also suggested by the findings from the first euro area survey of SMEs conducted by the ECB and the European Commission.

#### OVERALL ASSESSMENT OF RISKS IN THE CORPORATE SECTOR

Overall, the condition of euro area firms' balance sheets has deteriorated somewhat over the last six months. This trend may come to a halt in the coming months, but it may take some time before it begins to reverse. This is because the operating environment confronting non-financial firms is expected to remain challenging over the short term, further delaying the recovery of firms' profits and thus their ability to generate internal funding. At the same time, firms' indebtedness remains high and they also face challenging external financing conditions owing to banks' tight lending policies. These factors point to considerable vulnerabilities and raise the risk of corporate sector defaults remaining elevated in the near term. Over the medium term, better economic growth prospects should contribute to alleviating some of the risks stemming from balance sheet vulnerabilities in the corporate sector. This improvement, however, will depend heavily on the strength and speed of the recovery of the macroeconomic environment, expected in the course of next year. If the recovery is slow, firms' profits may deteriorate further, leading to higher corporate sector defaults and higher than expected loan losses on corporate sector credit exposures for banks. Ultimately, a new round of adverse feedback effects from the financial sector to the real economy could be triggered.

#### 2.3 COMMERCIAL PROPERTY MARKETS

##### DEVELOPMENTS IN COMMERCIAL PROPERTY MARKETS

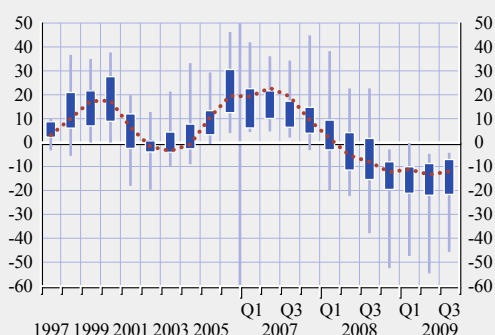
Conditions in euro area commercial property markets have deteriorated further during the past six months, which was in line with the expectations expressed in the June 2009 FSR. Capital values – i.e. commercial property prices adjusted downwards for capital expenditure, maintenance and depreciation – for prime property declined by an average of 12% in the third quarter of 2009, as compared with the same quarter in 2008. All euro area countries recorded declining values compared with the third quarter of 2008, although the extent of the decline ranged from -4% to -46% (see Chart 2.4).

Commercial property investment volumes in the euro area stood at around €6.1 billion in the third quarter of 2009.<sup>4</sup> This represented a 40% decrease compared with the third quarter of 2008, and an 82% decrease compared with the peak in the second half of 2007 (see Chart 2.5). Despite the still low levels of investment activity, volumes increased somewhat in the second and third quarters of 2009 compared with the first quarter. This was the first sign in seven quarters of investment volumes stabilising.

4 For a description of investment activity in Europe, see DTZ Research, "Money into property – Europe 2009", June 2009.

**Chart 2.4 Changes in capital value of prime commercial property in euro area countries**

(1997 – Q3 2009; percentage change per annum; maximum, minimum, interquartile distribution and weighted average)

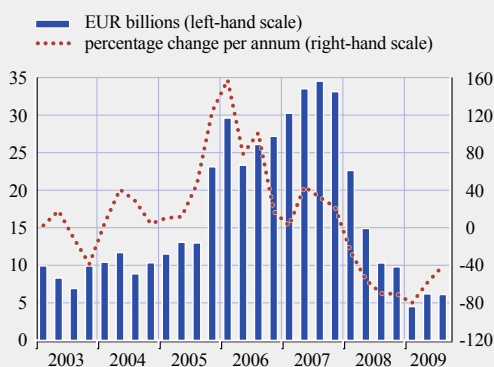


Source: Jones Lang LaSalle.

Note: Data for Cyprus, Malta, Slovakia and Slovenia are not available.

**Chart 2.5 Commercial property transaction volumes in the euro area**

(Q1 2003 – Q3 2009)



Source: DTZ Research.

## RISKS FACING COMMERCIAL PROPERTY COMPANIES

Income risks have increased for all types of commercial property companies since the finalisation of the June 2009 FSR as both prices and rents have fallen (see Box 6 for a description of different types of property companies in the euro area). The possibility of prices falling to levels below original purchase prices is mainly a concern for loan-financed investors as a large stock of commercial property loans are due to be refinanced in the coming years.

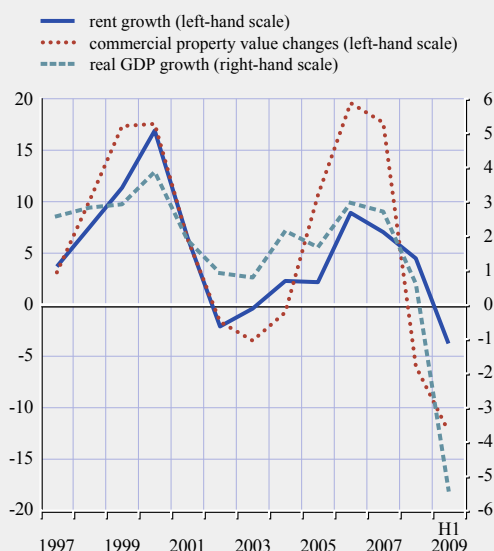
Commercial property rents in the euro area declined by almost 13%, year on year, for office space and by about 3% for retail space in the third quarter of 2009. However, developments across countries were heterogeneous, with rents in some countries falling by up to 30%, year on year. At the same time, office vacancy rates rose to an average of 10% in the third quarter of 2009.

The outlook for commercial property prices and rents largely depends on the future path of economic activity in the euro area as developments in commercial property markets follow the business cycle rather closely (see Chart 2.6). In addition, elevated tenant default rates in the period ahead (see Section 2.2)

and the continued weakness of the euro area labour market are also likely to keep demand for rented property muted (see Section 2.4). As a result, and despite better macroeconomic

**Chart 2.6 Changes in euro area capital value of prime commercial property, commercial property rent growth and euro area real GDP growth**

(1997 – H1 2009; percentage change per annum)



Sources: ECB and Jones Lang LaSalle.

Notes: Commercial property data for Cyprus, Malta, Slovakia and Slovenia are not available.

outcomes than those expected six months ago, as well as improvements in the macroeconomic outlook, some forecasters expect continued decreases in capital values and rents throughout 2009 and 2010.<sup>5</sup>

Funding costs and risks for commercial property investors have remained relatively high over the past six months. Although commercial property investors have, to some extent, benefited from low interest rates, banks continue to apply more conservative lending standards – including lower loan-to-value ratios – and higher margins for commercial property loans (see also Section 2.2).

## OVERALL ASSESSMENT OF RISKS IN COMMERCIAL PROPERTY MARKETS

As expected in the June 2009 FSR, conditions in commercial property markets have continued to deteriorate in the euro area over the past six months. Looking ahead, the negative developments in euro area commercial property markets are likely to continue until economic conditions improve and investor appetite for commercial property returns. More losses are therefore likely in the period ahead as a result of banks' exposure to commercial property lending and investment (see Section 4).

5 See DTZ Research (2009), op. cit.

### Box 6

#### PROPERTY COMPANIES IN THE EURO AREA

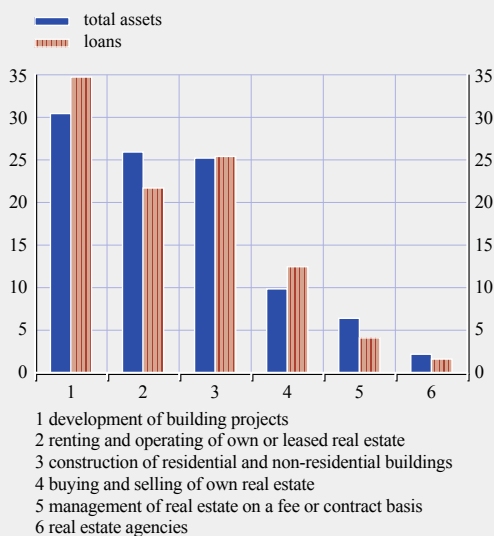
The business activities of property companies span a variety of areas related to real estate, and the definition of a property company is therefore a rather broad concept. This box briefly describes the structure of the property company sector in the euro area.

Property companies engaged in developing,<sup>1</sup> renting and operating, and/or constructing buildings account for more than 80% of the total assets of 31,000 property companies in the euro area (see Chart). Companies buying and selling properties account for an additional 10%, and management companies and real estate agencies for another 8%.

The relative size of the companies when measured by total loans received broadly follows that of the total asset distribution (see the chart). The largest credit exposures for banks are to property developers and property construction companies.<sup>2</sup> It is, however, difficult to obtain data for these segments

#### The relative size of different types of property companies in the euro area

(percentage of total; data for the last available year)



Sources: Bureau van Dijk (Amadeus) and ECB calculations.  
Notes: The data cover almost 31,000 companies in the euro area. The classifications are in line with the Statistical Classification of Economic Activities in the European Community (NACE).

1 This includes the development of building projects for residential and non-residential buildings by bringing together financial, technical and physical means to realise the building projects for later sale.  
2 It should, however, be noted that in some cases the size of the different property sectors vary significantly across euro area countries.

of banks' commercial property lending as they are often grouped together under the broader category "construction" (which also includes lending to railways and motorway builders, for example) (see Section 4).

From a financial stability perspective, it is important to know what kinds of activity the property companies that euro area banks lend to are engaged in. This helps to understand and analyse the credit risks with which banks are confronted. While bank lending to commercial property companies is, to a large extent, secured, significant drops in the value of collateral, as well as negative developments during the project or construction phases, can pose material risks to banks.

## 2.4 BALANCE SHEET CONDITION OF THE HOUSEHOLD SECTOR

Although the stabilisation of household sector indebtedness was confirmed in the six months after the finalisation of the June 2009 FSR, the overall condition of household sector balance sheets, as a potential source of risk from a financial stability perspective, has deteriorated slightly further in the second half of the year. This deterioration was, however, less severe than expected and the central scenario remains one of continued sustainability.

A relatively negative outlook for the labour market and household income – even if improved with respect to expectations of June 2009 – is likely to offset the ongoing positive effect of the past declines in short-term interest rates and their impact on the ability of households to service their debts. This leads to a somewhat less supportive environment for household sector balance sheets going forward. That said, the recent improvement in the macroeconomic outlook is likely to contribute to the mitigation of the increased risks stemming from the household sector over the past six months.

### HOUSEHOLD SECTOR LEVERAGE

According to integrated euro area accounts, the annual rate of growth in total loans to the household sector moderated further to stand at 2.0% in the second quarter of 2009, down from 2.7% in the previous quarter. More recent monthly data on loans granted by monetary financial institutions (MFIs) to households indicate that annual growth rates

turned negative in the third quarter of 2009. The moderating annual growth of MFIs loans to households reflects the recent declines both in borrowing for house purchase, which is the largest sub-component of loans to households, and in consumer credit (see Chart S61).

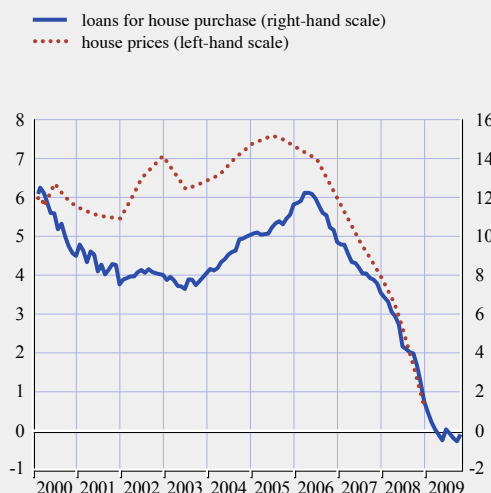
The continued weakness of household borrowing is in line with the weakness of economic activity, the uncertainty regarding income prospects and the marked slowdown in housing markets (see Chart 2.7). Indeed, some countries recorded declines in house prices in the first half of 2009 (see Table S4). Moreover, the level of household indebtedness, which is still high relative to previous cycles, may also have a dampening impact on borrowing.

The most recent information, however, suggests some levelling-off in lending to the household sector, albeit at a subdued level, after a sustained decline. Indeed, the results of the October 2009 bank lending survey showed that, on balance, banks assessed the demand for consumer credit and other lending to still be negative in the third quarter of 2009, while in the case of loans for house purchase, they assessed it to be, on balance, slightly positive, confirming the positive signs recorded in the previous quarter.

The level of household sector indebtedness is estimated to have increased slightly in the second quarter of 2009, to reach a level around 63% of GDP (see Chart S63). However, this increase is related to the strong deceleration in real activity, while debt continued to decrease,

**Chart 2.7 Loans for house purchase and house prices in the euro area**

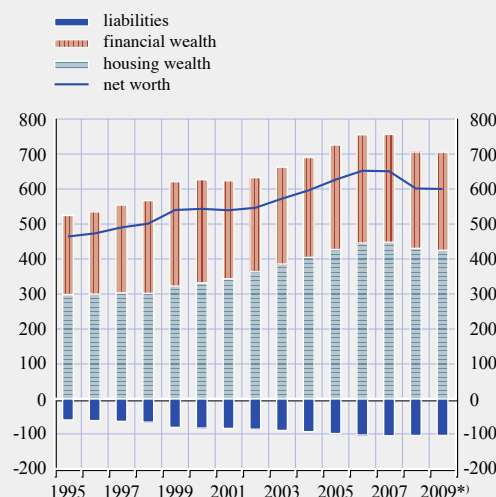
(Jan. 2000 – Oct. 2009, percentage change per annum)



Source: ECB.

**Chart 2.8 Household sector net worth in the euro area**

(1995 – 2009; percentage of gross disposable income)



Sources: ECB, Eurostat and ECB calculations.  
 Note: Data for housing wealth after 2003 are based on estimates.  
 \*) 2009 are estimates based on information available for the first half of the year.

albeit at a slower pace. The euro area household sector debt-to-GDP ratio remains below that recorded in other industrialised economies.

Turning to the asset side, in 2008 the value of household assets is estimated to have declined from the peak in 2007, although remaining above the value of debt. This decline is visible in both housing and financial wealth, although it is estimated to have been more marked for the latter. As a result, given the modest decline in the ratio of liabilities to gross disposable income, the net worth of households is estimated to have declined markedly in 2008. Estimates for the first half of 2009 indicate that housing wealth may have declined further, although more moderately than in 2008, while financial wealth has recovered slightly. This, together with a broadly stable share of liabilities, is expected to have led to a further, but marginal, decline in household net worth (see Chart 2.8).

Considering the potential ability of households to repay debt, the ratio of debt to wealth is estimated to have increased somewhat in 2008,

after remaining relatively stable in previous years (see Chart S64).

#### HOUSEHOLD SECTOR RISKS

Developments in interest rates and income are the two main sources of risk that can affect the ability of households to service their debt. Risks related to household income have continued to increase since the last FSR, while interest rate risks have declined further in recent months.

While the combined effect of the different risks is difficult to gauge, an approximation of the dynamics of overall credit risk in the euro area household sector is provided by an indicator of distress, more information about which can be found in Box 7. The indicator points to some stabilisation in the household sector in the first half of 2009, although at rather low levels, thus suggesting persisting vulnerabilities. The indicator is based on data from the euro area household sector's financial accounts (measured at market prices) and information on financial market volatility.

### Interest rate risks of households

Since the finalisation of the June 2009 FSR, the ECB has maintained key interest rates at a very low level, with a cumulative decline of 325 basis points since October 2008. This, together with the slowdown in household borrowing, has led to a levelling-off in households' overall debt servicing burden. In particular, interest payments are estimated to have declined further in the second quarter of 2009, to a level of 3.2% of disposable income (see Chart S65).

In order to have a more complete assessment of risks, one should focus on the most financially vulnerable segments of the population. Looking at micro data, it appears that households facing higher risk – as measured by the debt service ratio – are particularly those with a lower level of income. According to survey-based information available for 2005, the debt service ratios at the euro area level of the first and second income quintiles are estimated to have been 39.6% and 23.4% respectively, clearly above that for all households (15.3%), although the percentage of households with a mortgage outstanding in these two groups is relatively small (4% and 10.5% respectively).<sup>6</sup> The available data for 2007, which are incomplete, broadly confirm this picture.

Overall, the interest rate risk faced by households has remained subdued since the finalisation of the June 2009 FSR. Looking forward, while further declines in interest rates look unlikely, a relatively low level of interest rates should continue to support a reduction of the debt burden, in comparison with the 2008 level.

### Risks to household income

The evolution of household income, which is strongly linked to developments in the labour market, is one of the most important predictors of households' ability to meet their debt servicing obligations.

As regards economic growth, the macroeconomic environment has shown signs of improvement in the second and third quarters of 2009, compared with the second half of 2008. However, the labour market has continued to deteriorate in recent

months. In particular, the euro area unemployment rate continued to increase to reach a level of 9.7% in September, compared with 8.0% in the last quarter of 2008 (see Chart S45). This points to an increase in income-related risks for households.

The deterioration in labour market conditions has not been homogenous across euro area countries. Indeed, increases in the unemployment rate in Spain and Ireland continued to be especially significant, relative to other euro area countries. This was accompanied, in the case of Spain, by a relatively high debt service ratio for those in the lowest income quartile (see Chart 2.9), thereby reinforcing income-related risks. However, in Spain, the vast majority of lending is granted at variable rates. Thus, the current low level of interest rates is partly offsetting the negative impact of unemployment and is contributing to a reduction of the debt burden of Spanish households.

Survey evidence collected by the European Commission confirms the deterioration in the condition of the euro area labour market, and shows that in 2009, amid some signs of improvement, euro area households had a relatively negative perception of future unemployment prospects and, to a lesser extent, restrained expectations about their financial situation (see Chart 2.10).

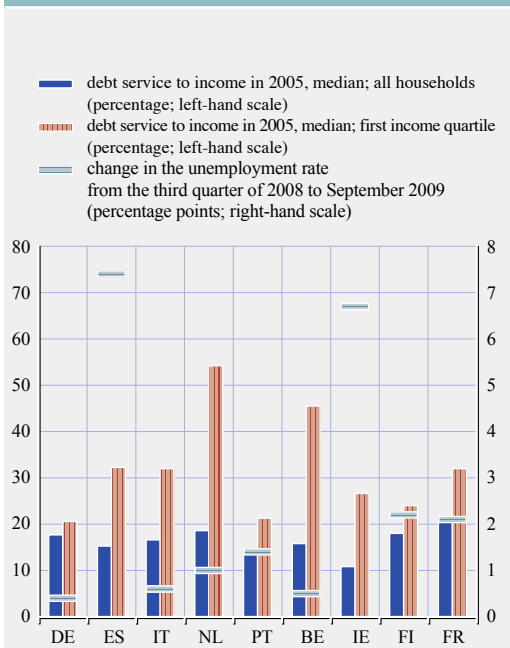
Looking forward, employment growth is expected to continue to decline, which will translate into a further increase in total unemployment. At the same time, real disposable income is expected to remain subdued in the near future, further increasing household income risks with respect to the situation six months ago.

### Risks to residential property prices

Euro area house price inflation continued to ease in 2008 and, at the country level, in early 2009. The latest available data indicate that euro area annual house price inflation has declined steadily from a peak of 7.6% in the first half of 2005 to 0.6% in the second half

<sup>6</sup> For more details, see Box 6 in ECB, *Financial Stability Review*, June 2009.

**Chart 2.9 Debt service-to-income ratio and unemployment rate developments in euro area countries**



Sources: Eurostat, ECB and ECB calculations.  
Notes: The debt service-to-income ratio refers to households holding a mortgage; data obtained from ECB, "Housing finance in the euro area", *Occasional Paper Series*, No 101, March 2009; reference year around 2005; for Spain, Belgium and Ireland, debt servicing is proxied by the total housing cost using the EU-SILC 2007. Unemployment developments for Italy refer to June, instead of September 2009.

**Chart 2.10 Euro area households' financial situation and unemployment expectations**

(Q1 1998 – Q3 2009; percentage balances; three-month-moving averages)



Source: European Commission Consumer Survey.  
Note: Expectations about unemployment prospects are presented in an inverted scale, i.e. an increase (decrease) in this indicator corresponds to more (less) optimistic expectations.

of 2008 (see Chart S67). The marked slowdown was widespread across euro area countries in 2008. In the first half of 2009, available data indicate that almost half of the countries in the euro area recorded an outright decline in house prices on an annual basis (see Table S4). In general, the countries that exhibited the strongest house price appreciation in the past tend to be those that are currently experiencing the most pronounced correction in house prices.

A crude measure of housing affordability – defined as the ratio of households' disposable income to the house price index – continued the upward movement that began at the end of 2007, mainly as a result of abating house price inflation (see Chart S66). This follows a fairly steady deterioration in this index over the past decade, only partly offset by lower lending rates over the period. This recent improvement

in crude affordability, in combination with lower interest rates in the course of 2009, may have provided a mild positive impetus to housing demand – reflected in a small rebound in loans to households for house purchase – which, however, remains at low levels. Indeed, despite improved affordability and borrowing conditions, pessimism regarding expected returns on housing is likely to continue to limit euro area housing demand. Within this environment of subdued housing demand, there have also been signs of weak housing supply. While there was a slight easing of the pace of moderation in real housing investment in the euro area in mid-2009, a continued strong decline in building permits would suggest continued weakness ahead. That said, the share of resources devoted to housing construction in the economy for the euro area as a whole has fallen back towards historical levels

(see Chart S46). These demand and supply patterns, together with the evolution of house prices relative to rental yields – which indicate that some overvaluation seems to persist (see Chart S68) – suggest that the evolution of euro area house prices and housing activity will remain subdued for some time to come.

Risks to financial stability stem from the impact of the ongoing correction in house prices, as well as from the effects of rapidly declining economic activity tied to the housing market. A major challenge with regard to the latter will be the re-absorption of resources elsewhere in the economy, particularly in those countries where the correction in housing sector activity has been most pronounced.

#### OVERALL ASSESSMENT OF HOUSEHOLD SECTOR RISKS

Overall, risks to the euro area financial sector originating from the household sector, albeit contained, could have increased somewhat over the last six months, mostly on account of deterioration in the labour market. Although the debt servicing burden has levelled off following the continued deceleration of loans to households and the sustained decline in lending rates, the outlook for the labour market point to a slight further deterioration in the condition of household sector balance sheets, even if less severe than that expected six months ago. Looking ahead, the improvement in the macroeconomic outlook may nevertheless contribute to mitigating higher household sector risks somewhat.

#### Box 7

##### MEASURING CREDIT RISK IN THE EURO AREA HOUSEHOLD SECTOR

To provide an approximation of changing patterns in the credit risk faced by the euro area household sector, this box applies a standard corporate finance model based on financial option pricing techniques. In the calculations, data from the euro area household sector's financial accounts (measured at market prices) and information on financial market volatility are used.

In applying this methodology, it is important to note that the balance sheet of the euro area household sector differs from the balance sheets of the financial and non-financial corporate sectors in several ways. First, a large share of household sector wealth is not covered by financial accounts statistics, mostly in the form of housing and other property assets. Second, the euro area household sector is characterised by a large net financial wealth position, i.e. the household sector's financial assets exceed their financial liabilities by a large margin. Households thus act as net lenders to the other sectors, most notably the government and the non-financial corporations sectors. Third, the liability side of the euro area household sector's balance sheet does not include shares or debt instruments as households do not issue financial securities. Rather, the household sector's liabilities mostly consist of short and long-term loans from banks and other financial intermediaries and smaller items such as net equity in life insurance reserves. Chart A shows the balance sheet position of the euro area household sector as at the end of the first quarter of 2009<sup>1</sup> on the basis of integrated euro area accounts.

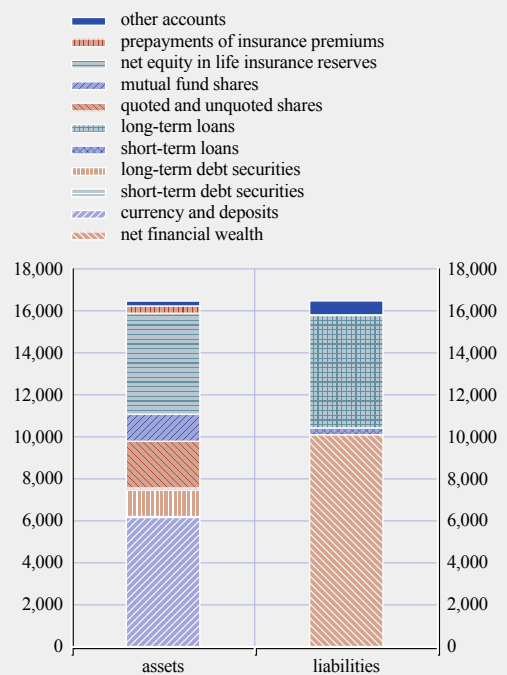
Since most measures of credit risk applied to non-financial firms (such as value at risk, distance to distress and probability of default) use outstanding traded equity and debt as input variables,

<sup>1</sup> An important caveat with respect to the chart is that substantial differences in household sector balance sheets exist across individual euro area Member States, in particular as regards the size of the net financial wealth position.

there are no readily available market indicators for assessing household sector credit risk. To circumvent the problem that no household sector equity is issued or traded in the financial markets, the household sector's net financial wealth position (i.e. the excess of households' financial assets over their financial liabilities) was used as a measure of equity. The financial liabilities positions – mostly in the form of short and long-term loans – are then taken to represent the debt component in the calculations. Equity volatility, an additional input variable to the calculations, is represented by a measure of broad stock market volatility. The model produces, in a first step, estimates of the market value of the household sector's assets and asset volatility, which are then used in a second step to calculate a measure of distance to distress, a widely used credit risk indicator that measures the distance of the market value of assets from the book value of liabilities. The point where the two values meet is called the "distress point", where all equity is depleted and where creditors can typically take action to secure their interests. In other words, a lower reading of the distance to distress measure indicates higher credit risk. Declines in a sector's distance to distress are driven mainly by two components: higher leverage (indebtedness) and higher volatility of assets.

**Chart A Euro area household sector's balance sheet**

(EUR billions)



Source: ECB.

Note: Net financial wealth is defined as financial assets minus financial liabilities.

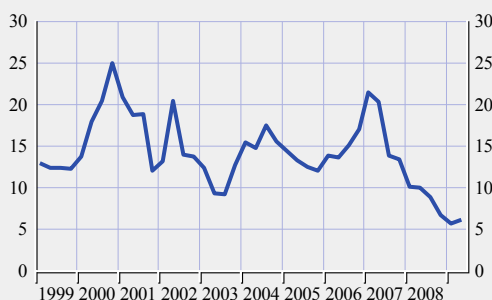
Chart B shows the quarterly evolution of the distance-to-distress indicator for the euro area household sector between the first quarter of 1999 and the first quarter of 2009. It shows that the measure declined to relatively low levels, and credit risk increased commensurately, in 2002-03, during the aftermath of the fall in stock market valuations which led to large declines in the market value of the household sector's financial assets. The measure then increased to reach a peak (illustrating low credit risk) in early 2007, right before the onset of the financial market turmoil that was triggered by the collapse of the US sub-prime mortgage market. The improvement in the outlook for credit risk in 2005-07 was driven by a sharp decline in asset volatility, which reflected the general under-pricing of risks at the time and more than offset the downward pressure on the indicator originating from the gradual increase in euro area household sector indebtedness throughout the past decade. The jump in volatility in the third quarter of 2007 then triggered a sharp decline in the distance to distress as the credit risk associated with the household sector surged. This suggests that it is also important to closely monitor the main components of credit risk indicators as abnormally low values of volatility can swing quickly when market sentiment

worsens abruptly, exposing vulnerabilities that may have accumulated gradually over time.

In practice, the high credit risk associated with the household sector over the past two years has been reflected in increasing risk premia required by lenders on newly issued loans. Evidence of such behaviour can be found in the substantial tightening of lending standards applied by banks on household sector loans. Looking ahead, an increase in distance to distress and an improvement in household sector creditworthiness are expected to materialise over time, as euro area households repay their debts and reduce their financial leverage.<sup>2</sup>

**Chart B Euro area household sector's distance to distress**

(Q1 1999 – Q1 2009; number of standard deviations)



Sources: ECB, Bloomberg and ECB calculations.  
Note: A lower reading of distance to distress indicates higher credit risk.

<sup>2</sup> The indicator should be interpreted with caution. The most recent improvement in the reading of the distance to distress in Chart B is driven, to a significant extent, by abating stock market volatility.





## III THE EURO AREA FINANCIAL SYSTEM

### 3 EURO AREA FINANCIAL MARKETS

Since late May 2009, liquidity in the euro money market has improved, thanks largely to further enhanced credit support measures introduced and implemented by the Eurosystem. However, by late November 2009, the redistribution of liquidity in the interbank market had not yet fully normalised, and a number of banks were still dependent on Eurosystem liquidity support. Improvements in the macro-financial conditions contributed to the compression of intra-euro area sovereign bond spreads. However, concerns about the fiscal sustainability risk and the crowding-out of private borrowing remained. The Eurosystem's covered bond purchase programme contributed to the strong recovery of the euro area covered bond market, in terms of both higher issuance and tighter covered bond spreads. By contrast, conditions in the asset-backed securities market remained strained and its recovery may be further hindered by concerns about losses on underlying residential or commercial mortgages. Against this background, the stock market rebound continued, led by increases in the prices of financial stocks.

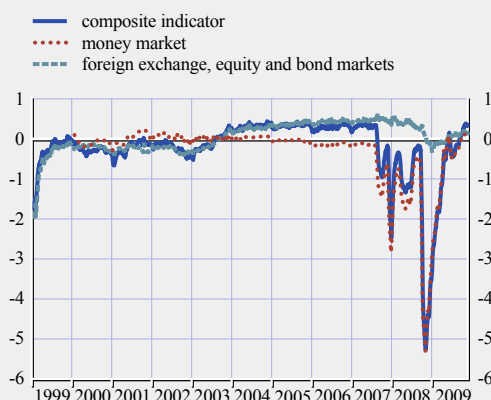
#### 3.1 KEY DEVELOPMENTS IN THE MONEY MARKET

Conditions in the euro money market continued to improve after the finalisation of the June 2009 Financial Stability Review (FSR). The money market component of the composite financial market liquidity indicator suggested that liquidity in this market segment in late November 2009 was higher than in late May 2009 (see Chart 3.1).

After the finalisation of the June 2009 FSR, the ECB continued to apply the enhanced credit support measures it had initiated in October 2008. On 7 May 2009, these measures were supplemented by the introduction of three one-year longer-term refinancing operations (LTROs) and the covered bond purchase programme (see Box 9). Both measures proved to be successful in addressing the funding

**Chart 3.1 Financial market liquidity indicator for the euro area and its components**

(Jan. 1999 – Nov. 2009)



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 over the period 1999-2006 for non-money market components and 2000-06 for money market components. The data shown have been exponentially smoothed. For more details, see Box 9 in ECB, *Financial Stability Review*, June 2007.

liquidity risk of banks and alleviating tensions in the euro money market.

Against the backdrop of diminishing risk aversion, market intelligence suggested that credit lines were being reopened, although still very gradually and selectively. Counterparty credit risk concerns, as gauged by longer-term spreads between interbank deposit and repo interest rates, have been steadily declining (see Chart S70).

The first one-year LTRO, conducted as a fixed rate tender for an unlimited amount on 24 June 2009, attracted unprecedented demand, both in terms of volume (€442 billion were allotted) and in terms of the number of participating banks (1,121 bidders). Given that the interest rate charged by the ECB was significantly below market rates prevailing at that time, banks viewed the operation as a unique opportunity to finance the asset side of their balance sheets relatively cheaply and to lengthen the maturity profile of their liabilities. This explains the very diverse profile of the

banks bidding in the operation, as well as the high number of bidders.

The demand in the second one-year LTRO, conducted on 30 September 2009, was much lower (€75 billion), although the number of bidders remained high (589 banks). The smaller allotment amount was generally perceived by market participants as an encouraging sign that market demand for surplus liquidity had declined in comparison with that in the June 2009 one-year LTRO operation. The demand in the second operation could have also been reduced by the lower levels of longer-term money market rates in late September 2009.

In the absence of liquidity-absorbing operations, the abundant liquidity conditions resulted both in a continuous and extensive use of the ECB's deposit facility (see Chart 3.2) and in a marked decline in very short-term money market rates. As a result, after the allotment of the first one-year LTRO on 25 June 2009, the EONIA fell to, and thereafter oscillated around, the level of 35 basis points, only 10 basis points above the rate on the ECB's deposit facility.

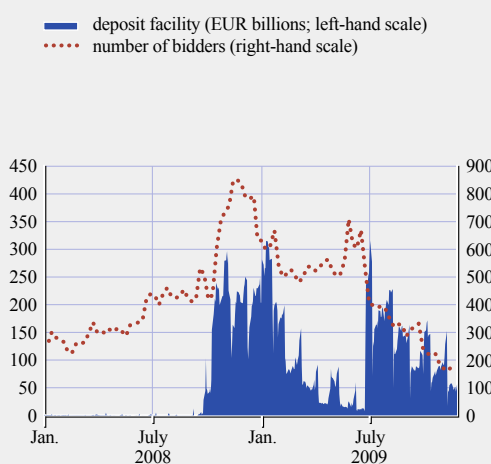
After the allotment of the first one-year LTRO, the volatility of the EONIA declined considerably. This in turn benefited market activity, improved liquidity in the EONIA overnight index swap (OIS) market and contributed to narrower bid-ask spreads (see Chart S69).

A significant decline in interest rates at the short end of the money market yield curve led to a steepening of the curve and has reportedly spurred more interest in longer-term unsecured money market transactions, especially by institutional money market investors. This search for a higher yield and ample liquidity provided by the Eurosystem exerted downward pressure on unsecured deposit and repo interest rates for longer maturities.

At the same time, however, the intermediation role of the Eurosystem increased significantly and to some extent crowded out interbank lending activity (see Chart 3.3). After the first one-year LTRO, turnover in the unsecured interbank market declined and the average daily EONIA volume fell by about €10 billion to around €30 billion.

**Chart 3.2 Recourse to the ECB's deposit facility and the number of bidders in main refinancing operations**

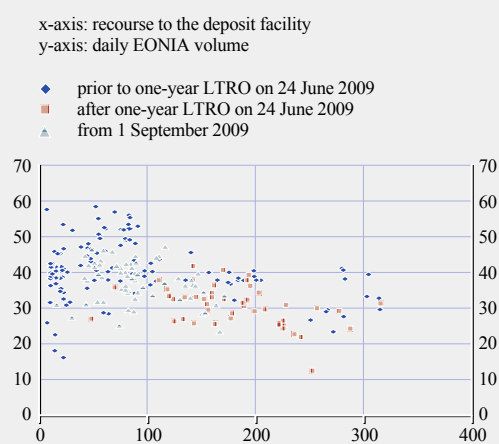
(Jan. 2008 – Nov. 2009)



Source: ECB.

**Chart 3.3 EONIA volumes and recourse to the ECB deposit facility**

(Jan. 2008 – Nov. 2009; EUR billions)



Source: ECB.

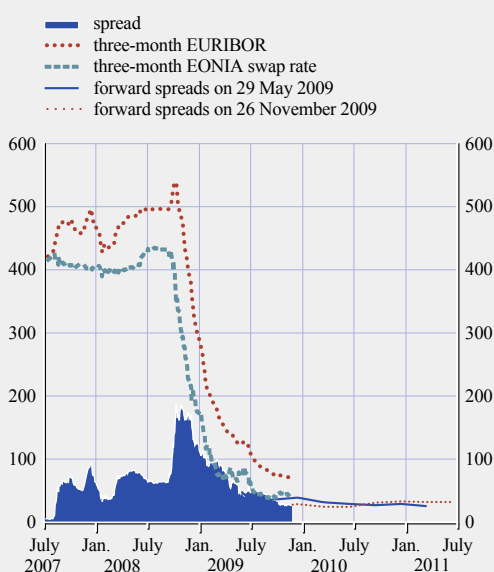
However, after early September 2009, the average daily EONIA trading volume increased somewhat, reflecting a gradual decline in the amount of surplus liquidity provided by the Eurosystem.

Ample liquidity and the ongoing repricing of counterparty credit risk facilitated the compression of money market spreads. EURIBOR/OIS spreads continued to narrow across all maturities, falling to levels below those that prevailed prior to the Lehman default. However, the pace of decline moderated and, by late November 2009, the spreads for maturities beyond one month had not yet returned to the pre-crisis levels. In late November 2009, forward spreads indicated that for the coming months, market participants were pricing in the consolidation of spreads at the levels prevailing at that time. However, increasing expectations of a central bank exit from support measures seemed to exert some upward pressure on forward spreads at longer horizons (see Chart 3.4).

It is noteworthy that, despite a number of positive developments, several indicators still continued to point to lingering tensions in the euro money market and suggested that the signs of improvement contained in some indicators, e.g. in the level of shorter-term EURIBOR/OIS spreads, might have overestimated the actual state of the euro money market, as they may have been significantly affected by the abundant liquidity injections by the Eurosystem. For example, even after two one-year LTROs, allotments in the Eurosystem's main refinancing operations remained relatively high in late November 2009. This resulted in a continuous and substantial use of the ECB's deposit facility (see Chart 3.2) and was symptomatic of the segmentation and still not fully normalised redistribution of liquidity in the interbank market. Moreover, the dispersion of the individual EURIBOR contributions remained above the pre-Lehman levels (see Chart 3.5), and thus also pointed to the still segmented

**Chart 3.4 Contemporaneous and forward spreads between the EURIBOR and EONIA swap rates**

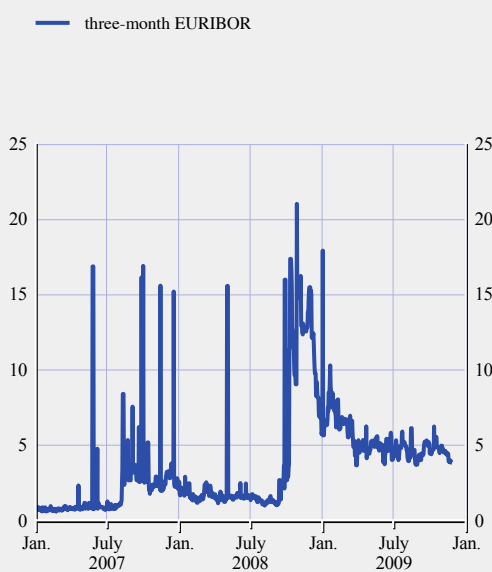
(July 2007 – June 2011; basis points)



Source: Bloomberg.

**Chart 3.5 Dispersion of individual contributions by banks in the EURIBOR panel**

(Jan. 2007 – Nov. 2009; basis points; standard deviation of individual bank contributions)



Sources: European Banking Federation and ECB calculations.

money market and the continuing uncertainty about the cost of funding for some banks.

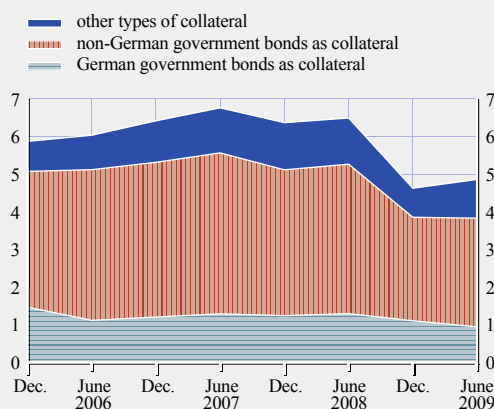
The secured segment of the euro money market showed resilience and some signs of stabilisation, and this was reflected in the findings of various market surveys conducted in the second quarter of 2009. The most recent semi-annual European repo market survey by the International Capital Market Association (ICMA) was conducted in June 2009 and showed a slight increase in the size of the repo market, after a significant contraction back in December 2008. Based on the results of the ECB's Euro Money Market Survey 2009, the turnover in the secured market during the second quarter of 2009 was 5% higher than in the second quarter of 2008 (see also Box 8).

In addition, the latest European repo market survey provided some tentative evidence of improved risk appetite, which was reflected in the reversal of some of the developments observed in December 2008. First, the share of government bonds used as collateral in repo transactions fell to 81%, from 84%. In particular, the share of German government bonds, which were favoured as the most liquid and secure bonds at the peak of the financial crisis (see Chart 3.6), declined by almost 5 percentage points to 25%. On the other hand, the share of government bonds in tri-party repos increased markedly to a record level of 53%. Second, the share of outstanding repo contracts that were negotiated anonymously and settled through a central clearing counterparty (CCP) declined from a record 18% in December 2008 to 15% in June 2009, but was still larger than a year ago.

However, despite a modest recovery in the secured segment, other findings of the European repo market survey still painted a somewhat mixed picture. Individual reporting financial institutions faced very different challenges. Some institutions were still deleveraging by substantial amounts, while others were demonstrating a greater appetite for risk.

**Chart 3.6 Total outstanding volumes in the European repo market by type of collateral**

(Dec. 2005 – June 2009; EUR trillions)



Source: ICMA.

Note: Data are not adjusted for the double counting of transactions between pairs of survey participants.

The preference for collateralised lending was also reflected in the level of activity in the “Mercato Interbancario Collateralizzato” (MIC) scheme managed by the Banca d’Italia and the operator of the e-MID electronic interbank trading platform. In June 2009, the scheme was extended until the end of 2010. Weekly trading volumes in MIC remained high, with the outstanding amount reaching a record high of €5.9 billion in October 2009 and staying close to that level in November 2009. Also in terms of participation, the number of participants expanded from 52 banks at the end of April 2009 to 57 banks in late November 2009. The average maturity of transactions increased, reaching 86 days by late November 2009.

The euro commercial paper (ECP) market, which used to be an important source of short-term funding prior to the Lehman bankruptcy, seemed to have found a more secure footing. After reaching a record low in June 2009, the amounts outstanding have stabilised after the prolonged post-Lehman decline. Improved sentiment and a steeper money market yield curve spurred the lengthening of the maturities of new ECP issues, reflecting both investors’ search for yield and issuers’ willingness to pay a price for maturity lengthening. By the end

of October 2009, the share of ECP issued with maturities of less than one month declined to around 20%, which was even slightly below the levels that had prevailed in early 2007. Moreover, the outstanding amounts started to recover, led by ECP issued by financial institutions. Nonetheless, the market remained confined to high-credit-quality ECP, which continued to account for more than 90% of the total amount of ECP outstanding.

In summary, despite increasing indications of an improvement in the functioning of the euro money market, some sources of risk identified in the previous FSR issue still remained relevant. First, despite a significant decline in

the number of bidders, some banks seemed to be still rather dependent on refinancing from the Eurosystem, for which they had to pay a significant premium above the EONIA, despite a large liquidity surplus in the system. Second, the relatively low levels of money market spreads, especially at shorter maturities, should not be interpreted in isolation because their levels appeared to be strongly affected by the Eurosystem actions. Furthermore, several other indicators continued to point to protracted tensions and segmentation in the euro money market. Nonetheless, in the absence of additional market shocks, conditions in the euro money market should continue to improve in the period ahead.

#### Box 8

##### MAIN FINDINGS OF THE EURO MONEY MARKET SURVEY 2009

On 24 September 2009, the ECB published the results of the Euro Money Market Survey 2009, which were based on data collected from banks in 27 European countries and covered developments in various segments of the euro money market in the second quarter of 2009. This box reports on the survey's main findings.

This year's survey revealed that some major shifts took place in the euro money market between the second quarters of 2008 and 2009. The demise of Lehman Brothers in September 2008 and the introduction of enhanced credit support measures by the ECB as from October 2008 could be seen as main triggers for those changes.

The overall turnover in the euro money market contracted in the second quarter of 2009, extending the decline observed in the second quarter of the previous year. The turnover in the unsecured segment decreased by 25%, with more severe declines reported for longer maturities. This could be partly attributed to heightened concerns about the creditworthiness of counterparties in the interbank market in the aftermath of the Lehman default, since several counterparties reported a shift from unsecured to secured transactions. However, abundant liquidity resulting from the unprecedented central bank measures implemented since autumn 2008 and, in particular, the large liquidity provision in the one-year full allotment tender on 24 June 2009 could, to some extent, also have contributed to a lower turnover in the interbank market (see Chart 3.3). In line with quantitative findings, the qualitative assessment of the unsecured market by the participating banks also showed deficiencies in the functioning of this market segment both in terms of efficiency and liquidity conditions.

Secured (repo) market turnover went up by 5%, in contrast to last year's contraction of around 12%. However, several indications continued to point to higher counterparty credit risk concerns also in the secured market segment:

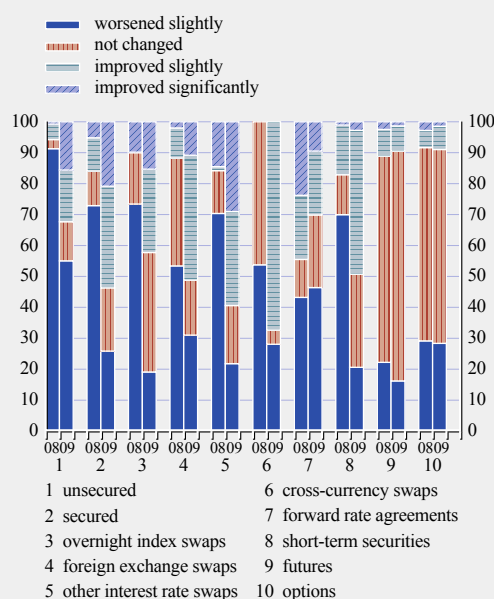
- (a) The share of overnight and open repos in total turnover continued to increase in 2009 and accounted for 27% of secured trades, the largest proportion since 2003.
- (b) Although no historical comparison is possible for the turnover in secured transactions settled through central clearing counterparties (CCPs) – as the ECB has started to collect such data only in 2009 – such transactions accounted for 39% of total secured market turnover. The attractiveness of CCP repo stems from the resulting balance sheet efficiency in terms of regulatory capital use and reduced counterparty risk.
- (c) Both in the unsecured and in the secured market segments, banks continued to show a greater preference for trading with their national counterparties and tended to favour more discreet trading methods, such as direct and voice-brokered trading.
- (d) The market share of the top 20 banks tended to increase in most euro money market segments. The unsecured market remained the least concentrated segment, followed by the OIS and secured market segments.

In the OTC derivatives markets, similar to last year's developments, the turnover of forward rate agreements continued to increase, benefiting from a decline in the overnight index swaps (OISs), as banks were increasingly using forward rate agreements for hedging against interest rate risk. Moreover, the high volatility of the EONIA and uncertainty among market participants about the amount of liquidity that would be demanded in the one-year ECB tender in June 2009 may have led to a deterioration of liquidity in the OIS market in the second quarter of 2009.

Overall, the results of the Euro Money Market Survey 2009 pointed to a continued contraction in euro money market activity in the second quarter of 2009, as compared with the second quarter of 2008, although there were some tentative signs of stabilisation in some market segments. The qualitative part of the study showed that, in a number of market segments, the majority of respondents reported some stabilisation, albeit at very low levels, and even some improvement in market liquidity conditions following the unprecedented deterioration recorded in the second quarter of 2008 (see the chart). Yet, banks' assessments remained mixed and a significant number of respondents reported a further deterioration in all segments of the euro money market also in the second quarter 2009.

#### Has market liquidity in the euro money market changed with respect to last year?

(percentage share of the total turnover of respondents who answered the respective question)



Source: ECB.

## 3.2 KEY DEVELOPMENTS IN CAPITAL MARKETS

### GOVERNMENT BOND MARKETS

Since the finalisation of the June 2009 FSR, euro area long-term bond yields have declined. At the end of November 2009, the term spread, however, remained at levels not seen since the launch of the euro (see Chart S73).

Intra-euro area sovereign spreads, as well as euro area sovereign CDS spreads, have generally narrowed further, after experiencing some swings, however. They benefited from an improvement in the macroeconomic outlook and its expected positive impact on fiscal imbalances, as well as from an increase in investors' risk appetite. In some cases, the spreads almost returned to the levels seen prior to the Lehman collapse (see Chart 3.7).

Available evidence suggests that the bank rescue packages announced by most euro area governments in the autumn of 2008 led to a "risk transfer" from the banking sector to the governments, whose fiscal positions had already been affected by the economic crisis, and thereby also contributed to the consequent widening of sovereign CDS spreads.<sup>1</sup> The recent improvement

in the euro area economic outlook has diminished the perceived fiscal risks associated with such rescue plans, thereby contributing to the narrowing of sovereign CDS spreads. In addition, the significant narrowing of the spreads between French and German government bonds and those of domestic agencies with a full government guarantee (CADES in France and KfW in Germany) suggested that a reduction in flight-to-liquidity flows also contributed significantly to the compression of intra-euro area sovereign bond yield spreads.<sup>2</sup>

Investors' discrimination between sovereign euro area issuers remained, however, as evidenced also by a wide dispersion of correlations between the euro area stock index changes and government bond returns in the four largest euro area economies (see Chart 3.8).

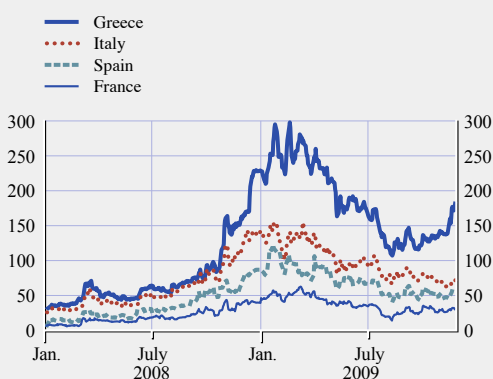
The sustained decline in implied bond market volatility suggested lower uncertainty about

1 See J. Ejsing and W. Lemke, "The Janus-headed salvation: sovereign and bank credit risk premia during 2008-09", *ECB Working Paper Series*, forthcoming.

2 For more details, see Box 4, entitled "New evidence on credit and liquidity premia in selected euro area sovereign yields", in ECB, *Monthly Bulletin*, September 2009.

**Chart 3.7 Intra-euro area yield spreads on ten-year government bonds**

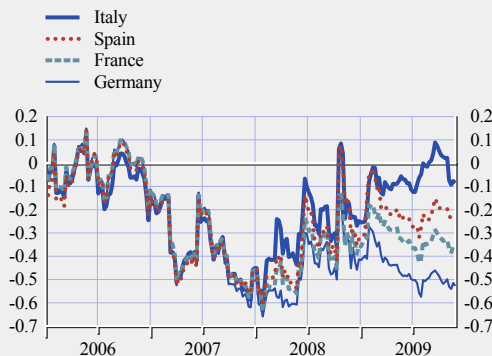
(Jan. 2008 – Nov. 2009; basis points)



Sources: Thomson Reuters Datastream and ECB calculations.  
Note: The chart shows ten-year yield spreads relative to Germany.

**Chart 3.8 Conditional correlation between weekly government bond and stock returns**

(Jan. 2006 – Nov. 2009)



Sources: Reuters, Thomson Reuters Datastream and ECB calculations.

Notes: Estimated using a multivariate GARCH model with exponentially declining weights. Stock returns are based on the Dow Jones EURO STOXX index and bond returns on the ten-year Thomson Financial Datastream government bond indices for each country.

long-term bond yields, but in late November 2009 it still remained above the levels observed prior to the beginning of the financial turmoil in the third quarter of 2007 (see Chart S74).

Net issuance of euro area government debt securities slowed down in the second half of 2009, but still remained relatively high. In September 2009, the annual growth rate of the net issuance of short-term government securities was 65%, partly because the steeper yield curve made short-term financing relatively cheaper. Moreover, the share of short-term debt in the total amount outstanding reached 14%, a new peak since the introduction of the euro in 1999. Despite substantial issuance, strong demand by banks and various institutional investors globally appeared to more than offset upward pressure on government bond yields.

Looking ahead, the prospects for euro area government bonds continue to be surrounded by persistent uncertainty about macro-financial developments. Long-term government bond yields seem to embody a more cautious assessment of the growth outlook than that reflected in stock price developments. Upward risks could stem from a further unwinding of flight-to-safety and flight-to-liquidity flows. In addition, slower than expected growth may increase the financing needs of euro area governments and bond markets may face difficulties in absorbing higher government bond issuance that may also crowd out private sector issuance.

### CREDIT MARKETS

Amid more signs suggesting that the economic slowdown may have bottomed out, uncertainty in credit markets decreased and by late November 2009 led to improved liquidity and increased risk appetite. Consequently, corporate bond spreads declined, for both financial and non-financial corporate bonds and across rating categories. Despite some signs of stabilisation, conditions in the asset-backed security (ABS) market, however, remained weak, with almost no public placements taking place and spreads remaining at elevated levels, especially those of commercial mortgage-backed securities (CMBSs).

### Debt security issuance

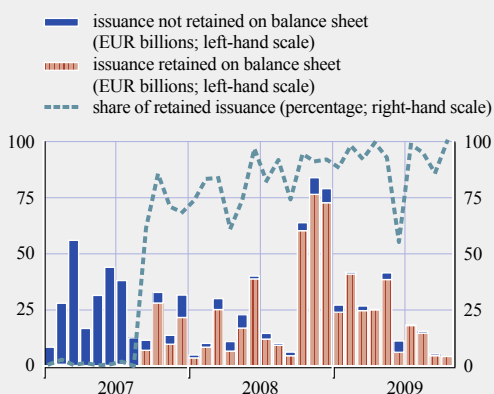
In the first half of 2009, corporate bond issuance in the euro area increased to record highs, as many larger corporate borrowers replaced bank credit with market-based financing. However, the pace of issuance moderated somewhat in the third quarter of 2009. While debt issuance at the beginning of the year was mostly restricted to borrowers with the best credit quality, the rebound in risk appetite and stronger expectations of an economic recovery also increased demand for high-yield corporate bonds issued by companies whose activities are closely correlated with the business cycle.

While many corporate bond issues in the primary market were oversubscribed, liquidity in the secondary market has also improved. Some market segments that were virtually closed following the collapse of Lehman Brothers reopened. For instance, it became possible again for financial institutions to issue hybrid capital.

In the euro area, most new ABS issues were still retained by banks and used as collateral in refinancing operations with the Eurosystem (see Chart 3.9). Since the finalisation of the June 2009 FSR, however, some more ABS deals have been placed publicly, while the volume of ABSs traded in the secondary market seems to have increased as well.

**Chart 3.9 Asset-backed security issuance by euro area banks**

(Jan. 2007 – Oct. 2009)



Sources: Dealogic and ECB calculations.

In late November 2009, issuance conditions in the CMBS market also remained challenging. Expectations of further losses on underlying commercial mortgage loans and covenant breaches weighed heavily on this market segment (see also Section 2.3).

By contrast, activity in the euro area covered bond market experienced a strong recovery, thanks largely to the Eurosystem's covered bond purchase programme (see Box 9). By late November 2009, €25 billion out of the planned €60 billion covered bonds had been purchased.

Many efforts and policies by both market participants and regulatory bodies aimed at reviving the ABS market should be acknowledged, although the effects will take time to feed through. A clear rebound of the market may require fundamental changes in terms of transparency, standardisation and simplicity. For example, in order to conduct proper due diligence on structured finance instruments, potential investors should be able to access and assess relevant information on the underlying assets.<sup>3</sup> The future design of the securitisation model may also include simpler deals and structures backing the deals. This would reduce the structural complexity of transactions and would reduce the (over-)dependence on the originator and the involvement of the originator in the deal. These measures are necessary to restart the market, but are by no means a sufficient condition to induce institutional investors to make new investments in ABS products.

Structured finance products contribute to the completeness of the financial system and increase the availability of credit to the economy. A well-managed and proper use of the securitisation technique allows a true credit risk transfer from the banking sector and provides diversification for end-investors. Securitisation is also important for non-bank and non-financial issuers, private repo markets and central bank funding. Given its importance, the Eurosystem participates actively in discussions on how to redesign the securitisation model.

### Credit spreads

Despite record supply, corporate bond spreads have tightened significantly since late May 2009 amidst even stronger demand by investors (see Charts S81 and S82). The historically low levels of money market rates prompted outflows from money market funds into riskier assets, including corporate bonds.

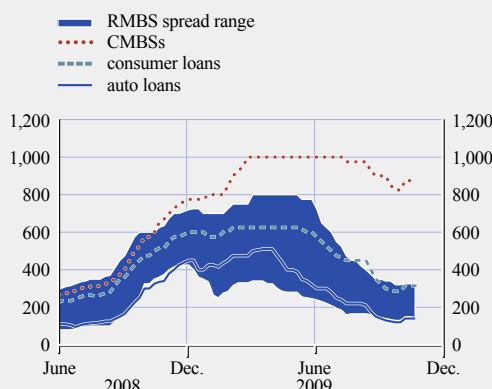
Covered bond spreads had tightened significantly after the announcement of the Eurosystem's covered bond purchase programme on account of both high demand and a limited supply in the secondary market. Spreads narrowed in almost all euro area jurisdictions and across all maturity buckets (see also Box 9). Since October 2009, however, spreads have stabilised, not least because of a higher supply of covered bonds in both primary and secondary markets.

Spreads on ABSs, although still relatively high, have tightened considerably since the finalisation of the previous FSR issue (see Chart 3.10).

3 See, for example, IOSCO, "Good practices in Relation to Investment Managers' Due Diligence When Investing in Structured Finance Instruments", July 2009.

Chart 3.10 European asset-backed security spreads in the secondary market

(June 2008 – Nov. 2009; basis points)



Source: JPMorgan Chase & Co.  
Notes: "RMBS" stands for "residential mortgage-backed security" and "CMBSs" stands for "commercial mortgage-backed securities". The RMBS spread range is the range of individual country index spreads on ABSs backed by residential mortgages in Greece, Ireland, Italy, the Netherlands, Portugal, Spain and the United Kingdom.

Investors were increasingly discriminating between various ABSs on the basis of the fundamentals of the underlying assets. While spreads on RMBSs and consumer credit ABSs decreased, spreads on CMBs remained elevated due to growing concerns about the conditions in the euro area commercial property market.

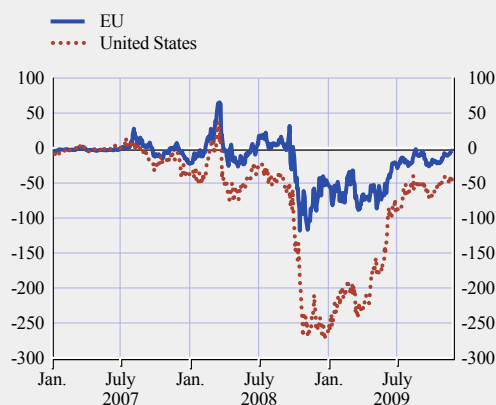
A significant tightening of the aggregate CDS-bond basis (the difference between CDS premia and yield spreads on corresponding cash market bonds), which had become markedly negative after the failure of Lehman Brothers, mirrored a gradual normalisation in the functioning of the corporate bond market and recovery in financial markets more generally (see Chart 3.11).

By late November 2009, the European CDS curve, which inverted after the bankruptcy of Lehman Brothers, had gradually returned to a more normal upward-sloping shape, thereby providing another sign of stabilisation in credit markets (see Chart S84).

Despite encouraging improvements, the outlook for euro area credit markets remains uncertain and vulnerable to high corporate default rates

**Chart 3.11 Investment-grade CDS-bond basis in the EU and the United States**

(Jan. 2007 – Nov. 2009; basis points)



Source: JPMorgan Chase & Co.

Note: For a description of how the indicator was constructed, see Box 9 in ECB, *Financial Stability Review*, June 2009.

and weaker or slower than expected economic recovery. In contrast to covered bonds, the recovery of the ABS market may be further hindered by concerns about the prospects for underlying residential or commercial mortgages. However, better and improving market liquidity may continue to have a stabilising influence on credit spreads.

#### Box 9

##### DEVELOPMENTS IN THE EURO AREA COVERED BOND MARKET

Before the eruption of the crisis, euro area financial institutions had been relying heavily on covered bonds to fund an important part of the increase in residential mortgage and public sector lending. This box describes the main developments in the euro area covered bond market during the crisis and reports on some of the effects of the covered bond purchase programme (CBPP) that was announced on 7 May 2009 and that constitutes an integral part of the enhanced credit support measures initiated and implemented by the Eurosystem.

Given its size, both in absolute and in relative terms, the euro area covered bond market represents a very important funding channel for various financial institutions, foremost among them banks. At the end of 2008, the nominal value of outstanding euro area covered bonds amounted to over €1.6 trillion. This represented about 15% of all assets eligible for Eurosystem credit operations. Although covered bonds issued in the euro area accounted for only about 3.6% of all debt securities issued by euro area monetary financial institutions (MFIs), the outstanding volume of

residential mortgage-backed covered bonds (€740 billion at the end of 2008) represented about 21% of total outstanding loans for house purchase by euro area MFIs.

The financial crisis had a material impact on covered bond spreads and issuance volumes, as well as on the maturity of new issues. Based on Markit's iBoxx euro covered bond index, spreads against mid-swaps widened from 6-7 basis points before August 2007 to as high as 185 basis points in April 2009 amid distressed sales and the uncertainty surrounding possible changes in associated credit rating methodologies. In addition, when deleveraging, investors preferred to sell covered bonds, rather than ABSs, since the former were more liquid. Total euro area jumbo covered bond issuance volume declined by €19 billion in 2007 and €46 billion in 2008, whereas they had increased by €14-16 billion in both 2005 and 2006.<sup>1</sup> While original maturities of ten or more years were common up to the outbreak of the turmoil, few covered bonds with maturities beyond seven years have been issued since August 2007.

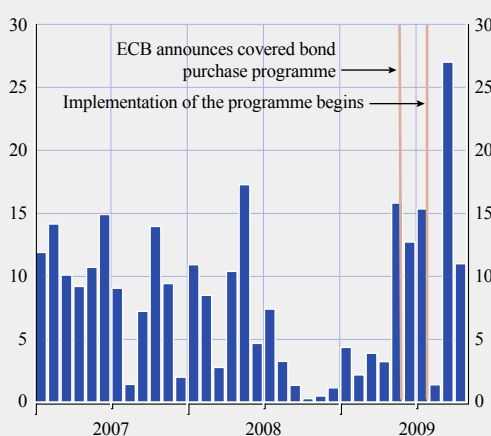
In the context of a depressed situation in the euro area covered bond market, the announcement and subsequent implementation of the €60 billion CBPP had a very positive impact. The impact of the CBPP can be divided into three distinct phases: (i) the announcement of the CBPP on 7 May 2009 itself contributed to the tightening of spreads, while (ii) the presentation of the specifications in June 2009 and (iii) the start of the implementation phase in July 2009 spurred and coincided with an increase in primary market activity (see Chart A). It should be noted, however, that it is difficult to disentangle the pure impact of the CBPP from the influence of the improvements in the broader macro-financial environment as, for example, covered bond spreads, as well as senior bank debt spreads, were already tightening before the announcement of the CBPP.

According to most private sector analysts, the CBPP has been particularly beneficial for the primary market, although monthly Eurosystem purchases of new covered bond issues have accounted for, on average, less than a quarter of the total CBPP purchases since July 2009. The amount of new jumbo covered bond issues increased from just €3 billion in April 2009 to more than €15 billion in May 2009, even before the actual purchases by the Eurosystem began in July 2009. In September 2009, jumbo covered bond issuance reached €27 billion, which was the second highest issuance volume in the history of the euro area covered bond market (see Chart A). At the same time, the maturities of newly issued covered bonds started to lengthen to up to 7-10 years.

In the secondary market, the average spread of covered bonds against mid-swaps has tightened by around 100 basis points (based on the Markit iBoxx index) since the CBPP was announced in early May 2009, but in late November 2009 it still remained above the pre-crisis levels

**Chart A Monthly issuance of euro-denominated jumbo covered bonds**

(Jan. 2007 – Oct. 2009; EUR billions)

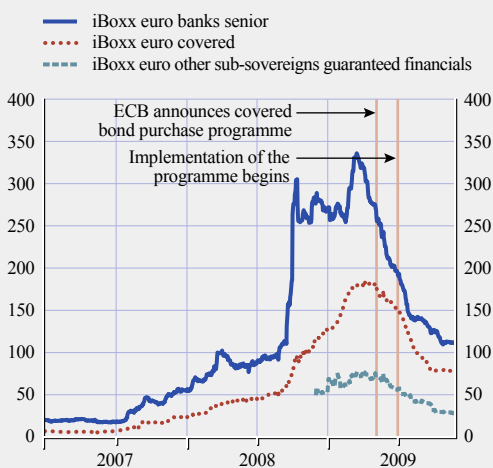


Source: Dealogic.

<sup>1</sup> Jumbo covered bonds are plain-vanilla covered bonds denominated in euro with a minimum issue size of €1 billion.

**Chart B Spreads of covered bonds and other bank bonds against swaps**

(Jan. 2007 – Nov. 2009; basis points)



Source: Markit.

(see Chart B). Covered bond spreads have reached levels where, for most banks, it has become cheaper to fund themselves through the issuance of covered bonds than through the issuance of government-guaranteed bonds, once one takes into account the fees that banks have to pay for those state guarantees.

Despite the important improvements, liquidity in the secondary market remained weak between May and September 2009, although there has been some improvement since October 2009. During the crisis and before the CBPP was announced, the market was often characterised by market participants as a “sellers-only” market. However, after the announcement of the CBPP, most investors became unwilling to sell, since they were expecting a further tightening of spreads. Consequently, bid-offer spreads remained wide,

there were very few firm offers and usually for small transactions only, and price transparency was lacking. Many banks no longer had sufficient balance sheet capacity to support their market-making activities in the open market, although they still tried to indicate two-way prices for their own clients internally. On 20 July 2009, Eurex launched a secondary market auction platform for covered and government-guaranteed bank bonds, with the aim of supporting price transparency and market liquidity, but the average trading volume has remained very small so far. Since October 2009, however, liquidity and the availability of offers in the secondary market have started to improve, largely because of investors’ perceptions that further rapid spread tightening was increasingly less likely.

The introduction and implementation of the CBPP has proved successful in alleviating tensions in the euro area covered bond market, although this took place against the background of improvements in the broader macro-financial outlook, which may also have helped. The CBPP has also facilitated the issuance of covered bonds that are not eligible for the CBPP. Moreover, the tightening of covered bond spreads since the announcement of the CBPP has significantly improved funding conditions for euro area banks.

## EQUITY MARKETS

Euro area equity markets continued to recover from the severe decline experienced during the financial crisis, supported by market optimism about the economic recovery and diminishing risk aversion (see Charts S75 and S18). Gains in the prices of financial stocks, especially of those that were more severely affected during the market downturn, were particularly strong and led the rebound of overall stock market indices.

Reflecting the improvement in market conditions, implied volatility derived from stock option prices suggested that by late November 2009 uncertainty about stock market developments had also decreased (see Chart S76). Nevertheless, it still remained significantly above the levels observed before the onset of the financial turmoil in mid-2007.

Increases in euro area stock prices were supported by a reversal of net outflows from

equity investment funds that focus on euro area equities. Following large outflows in the first quarter of the year and some stabilisation thereafter, sizeable net inflows were recorded in the third quarter of 2009, corroborating the evidence of a recovery of risk appetite in the euro area stock market.

By late November 2009, standard stock price valuation measures, such as the price/earnings (P/E) ratio based on 12-month-ahead earnings expectations, had risen markedly. Significant increases in stock prices in the euro area have pushed this ratio for the stocks of financial companies above the historical average level since the introduction of the euro in 1999. The corresponding ratio for non-financial firms, although also markedly higher, was close to the historical average (see Chart 3.12). A better P/E ratio that compares the prevailing stock price with an average of the previous ten years of earnings,<sup>4</sup> however, did not point to an

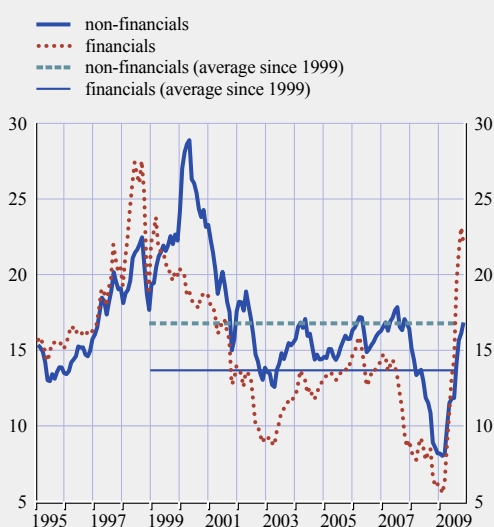
overvaluation of stock prices for the stock market as a whole (see Chart S78).

Analysts' expectations for earnings-per-share growth for euro area listed companies over the next 12 months were also revised upwards, and turned positive in July 2009, not least because of strong expected growth for financial companies. A decomposition of the annual returns in the euro area stock market into the contributions of the P/E ratio and expected earnings per share 12 months ahead suggests that, since the finalisation of the June 2009 FSR, annual gains have been driven more by higher valuation multiples than by profitability expectations (see Chart 3.13). Other factors that have also supported stock prices were the low levels of long-term interest rates and the return of risk appetite.

4 See R. Shiller, *Irrational Exuberance*, Princeton University Press, 2nd edition, 2005.

**Chart 3.12 P/E ratios of financial and non-financial corporations in the euro area**

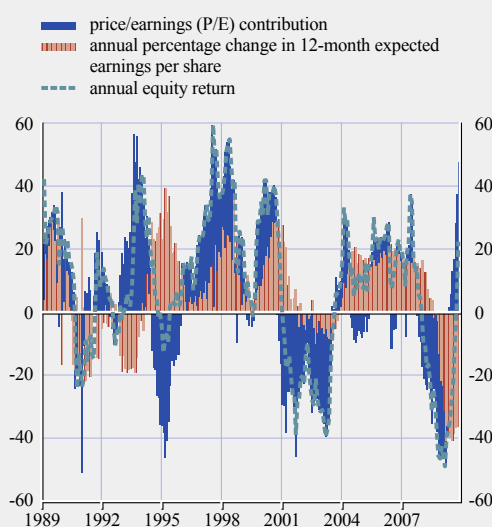
(Jan. 1995 – Nov. 2009; ratios based on 12-month-ahead expected earnings per share)



Sources: Thomson Reuters Datastream and ECB calculations. Note: MSCI EMU P/E ratios based on expected earnings per share by I/B/E/S.

**Chart 3.13 Decomposition of annual stock market returns in the euro area**

(Jan. 1989 – Nov. 2009; percentage change per annum)



Sources: Thomson Reuters Datastream and ECB calculations. Note: The stock price index used is the MSCI EMU.

All in all, the main risk for euro area stock markets is the possibility that a slower than currently expected economic recovery might hit growth-sensitive earnings of listed firms and put downward pressure on euro area stock prices. Against this backdrop, in late November 2009 market participants seemed to be preoccupied by the possibility of a short-term correction or at least a consolidating pause.

## 4 THE EURO AREA BANKING SECTOR

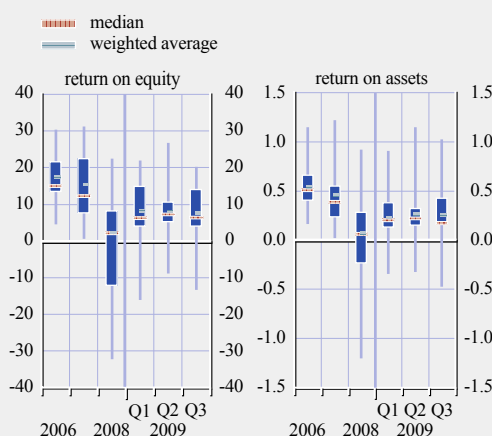
Conditions in the euro area banking sector improved markedly in the first three quarters of 2009, on account of the rebound in financial markets, better-than-expected business cycle developments and macroeconomic policy stimuli. Extraordinary remedial actions taken by the ECB and euro area governments since late last year were successful in restoring confidence in, and improving the resilience of, the euro area banking sector. Notwithstanding the recent improvement, the central scenario is for subdued banking sector profitability in the short to medium term, given the potential for a broad-based loan book deterioration, as well as market and supervisory authority pressure on banks to keep leverage under tight control. Given these prospects, a key source of downside risk is the possibility that the favourable macro-financial environment supporting banks' earnings might deteriorate before the peak of banks' loan losses is reached. Given the important role that public sector intervention has played in supporting the euro area banking sector, this calls for caution in avoiding timing errors in disengaging from public support.

### 4.1 FINANCIAL CONDITION OF LARGE AND COMPLEX BANKING GROUPS<sup>1</sup>

There was a broad-based recovery in the profitability of euro area large and complex banking groups (LCBGs) in the first three quarters of 2009, after the dismal financial performances in the second half of 2008. The median return on equity (ROE) in this group of institutions reached 7.21% and 6.41% in the second and third quarters of 2009 respectively (see Chart 4.1, left-hand panel). Although the improvement was relatively broad-based, the degree of dispersion across LCBGs remained wide. At the same time, the return on assets (ROA) of euro area LCBGs generally improved in the first three quarters of 2009 (see Chart 4.1, right-hand panel).<sup>2</sup> However, the mean ROA,

**Chart 4.1 Euro area large and complex banking groups' return on equity and return on assets**

(2006 – Q3 2009; percentage; maximum, minimum and inter-quartile distribution)



Sources: Individual institutions' financial reports and ECB calculations.

Notes: The left-hand chart is based on the Tier 1 measure of equity. Quarterly returns have been annualised. The charts exclude one significant outlier in the first quarter of 2009.

which reached 0.26% in the third quarter of 2009, remained significantly below the levels seen in 2006 and 2007.

- 1 There have been some changes in the institutions selected for inclusion in the sample of LCBGs which are analysed in this section, as compared with that in the December 2008 FSR. Each year, an analysis is carried out which aims to assess the importance of various institutions for the functioning of the euro area financial system on the basis of a number of criteria. These criteria, as well as the methodology used to carry out the assessment, are described in Box 10 of the December 2007 FSR. The sample used for the analysis carried out here includes 19 euro area banks. All historical time series were adjusted accordingly. However, at the time of writing, not all quarterly figures were available for all banks. In some charts in the section, where noted, the outliers are identified and excluded. Results for the complete sample can be found in Table S5 of the Statistical Annex.
- 2 The ROA is often regarded as a more pure measure of bank profitability than the ROE. This is because the ROA strips out the effect of leverage, as may be seen from the following accounting identity:  $ROE = ROA \times \text{leverage}$ , where leverage is the ratio of assets to Tier 1 equity. A number of euro area LCBGs have large off-balance-sheet positions, which can make the use of total assets in the denominator perhaps less meaningful. One way of overcoming this is to decompose ROA into the return on risk-weighted assets multiplied by the ratio of risk-weighted assets to total assets. In practice, this decomposition does not yield very different insights than the simple decomposition used here. This is because the ratio of risk-weighted assets to total assets is relatively stable over time, albeit also highly dispersed across institutions.

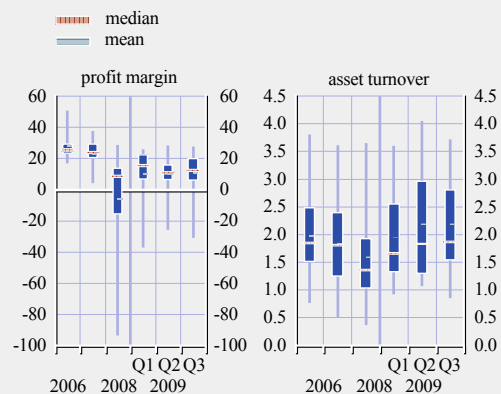
The profit margins and asset turnover ratios of euro area LCBGs tend to move in the same direction (see Chart 4.2).<sup>3</sup> In general, LCBGs with higher margins tend also to be able to achieve higher turnover rates.<sup>4</sup> LCBGs' profit margins hovered around 20-25% in 2006 and 2007, although the degree of dispersion across institutions was wide (see Chart 4.2, left-hand panel). In 2008 profit margins became very volatile, falling to -5.79%, on average. The significant drop in the average was mainly attributable to sizeable losses (and impairments) among some large institutions, reflected in a marked negative skew of the distribution in 2008. Thereafter, some recovery was observed and, by the third quarter of 2009, the average profit margin for euro area LCBGs reached 10.7%, although this still remained low by recent historical standards.

Asset turnover rates in banking are traditionally very low in comparison with those of other industries. Over the past two years, the turnover rate for euro area LCBGs was slightly below 2%, on average, and it fell to 1.59% in 2008 (see Chart 4.2, right-hand panel). Thereafter, it rose to 1.94% in the first quarter of 2009, to 2.19% in the second quarter, and remained broadly unchanged in the third. It seems very likely that fair value gains/losses on financial instruments were the main contributors to the swings in this ratio in 2008 and 2009.

Typically, banks' profits are influenced by the fact that they are highly leveraged institutions, with their equity bases being relatively small in relation to assets and income.<sup>5</sup> While high leverage allowed banks to obtain relatively high ROEs in the years leading up to the financial market turmoil, this leverage also amplified the adverse impact of losses on their performance afterwards. Some institutions in the upper quartile nevertheless maintained relatively high leverage until the first quarter of 2009 (see Chart 4.3). Others were faced with involuntary increases in their leverage multiples, as a result of a decline in the market value of their financial assets that followed from valuation losses on financial instruments

**Chart 4.2 Euro area large and complex banking groups' profit margin and turnover**

(2006 – Q3 2009; percentage; maximum, minimum and inter-quartile distribution)



Sources: Individual institutions' financial reports and ECB calculations.

Notes: Profit margin is defined as the ratio of net income to total operating revenues. Turnover denotes the ratio of total operating revenues to assets. The charts exclude outliers with profit margins below -100% and above 60%.

(notably unrealised losses on “available-for-sale” assets).<sup>6</sup> In the second and third quarters of 2009, leverage multiples fell, especially among institutions in the upper quartile (i.e. the most highly leveraged segment). The fall partly reflected recapitalisations of banks (see Chart 4.5). Lower risk appetite, reflected in the adoption of more prudent lending standards (see Section 4.2), and attempts to shed assets and/or limit the growth of balance sheets had an impact as well. Market and supervisory

3 The ROE can be decomposed further using the following accounting identity:  $ROE = \text{profit margin} \times \text{asset turnover} \times \text{leverage}$ , where profit margin denotes the ratio of net income to operating revenues (before impairments) and asset turnover is the ratio of operating revenues to assets.

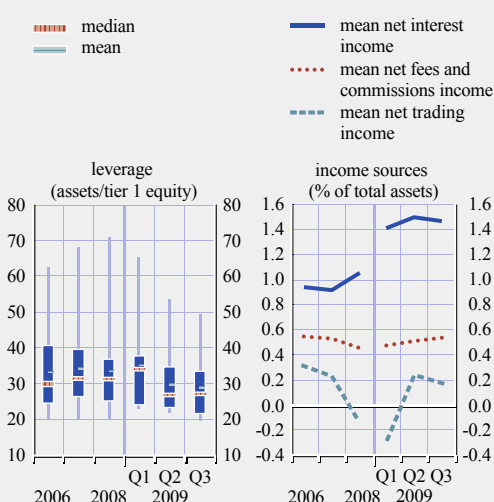
4 The correlation between margin and turnover for the panel of 19 LCBGs is 0.37 (statistically different from 0 at 99% confidence level) over the period from 2004 to 2008.

5 Evidently, leverage in itself is not the “raison d’être” for banks. Factors such as liquidity and risk transformation as well as information generation are the main explanations for the incurrence of large amounts of debt (deposits) in relation to assets.

6 It should be noted that this effect only arises where the impact of losses on the capital base are greater than the reduction in the value of marked-to-market assets on the balance sheet. There are currently three countries that use, or plan to use, a leverage ratio, namely the United States, Canada and Switzerland. Switzerland has introduced a leverage ratio for its two large internationally active banks that will take effect in 2013.

**Chart 4.3 Euro area large and complex banking groups' leverage and breakdown of income sources**

(2006 – Q3 2009; maximum, minimum and inter-quartile distribution)



Sources: Individual institutions' financial reports and ECB calculations.

authority pressure on banks to keep leverage under tight control, as well as the possibility of a simple leverage ratio being introduced in addition to risk-based capital requirements on a global scale, may have played a role in explaining these developments.<sup>7</sup>

Taken together and viewed from an accounting perspective, the improvement in LCBG profitability over recent quarters can be attributed mainly to an improvement in asset turnover that outweighed the negative effects of deleveraging. At the same time, notwithstanding heterogeneous developments, there was no clear trend in profit margins in the first three quarters of 2009.

#### SOURCES OF LCBG INCOME

Regarding sources of income, trading revenues and net interest income were the main drivers behind the strengthening of LCBG profitability in 2009 (see Chart 4.3, right-hand panel). The rise in net income has been notable in a context of a reduction in total assets and, especially, cross-border claims. Bank for International

Settlements' (BIS) statistics show, for instance, that total foreign claims of internationally active banks fell dramatically in the fourth quarter of 2008 and contracted further, albeit at a slower pace, in the first quarter of 2009 (see also Box 4).<sup>8</sup> This is attributed to various factors, including the drop in demand for trade finance, a tighter management of cross-border exposures and diminished opportunities for geographical diversification. It may also be a consequence of banks concentrating on domestic lending activity and retrenching from foreign markets after receiving government support. The slowdown in credit growth is also reflected in the evolution of LCBGs' loan-to-deposit ratios. Even though deposit growth slowed in 2009, it still outpaced loan growth in the same period. Both the mean and the median loan-to-deposit ratio of euro area LCBGs fell markedly, from 1.44 and 1.38 respectively in 2008 to 1.32 and 1.27 respectively at the end of the third quarter of 2009.

Thanks to the rebound in financial markets, there was a recovery in trading incomes, which made a strong contribution to the improved performance of LCBGs after the first quarter of 2009. Among the factors explaining the strength of net interest income were the steeper euro area yield curve and wider operating margins. In particular, a tightening of lending standards – carried out mainly by increasing spreads on new loans – and a gradual pass-through of lower policy rates to lending rates, as well as declining

<sup>7</sup> Pressure on banks to delever has been apparent from discussions in various international fora, such as the G20, which has called for the introduction of leverage ratios, in addition to risk-based capital ratios, in order to prevent banks from arbitraging capital requirements. In the global discussions on leverage ratios, due consideration should be given to differences in accounting standards, which bias the (simple) leverage multiples of European banks upwards. This is because the use of the International Financial Reporting Standards (IFRSs) results in significantly higher total asset amounts for banks that have substantial derivatives portfolios than those attained on the basis of the Generally Accepted Accounting Standards in the United States (US GAAP). In particular, IFRSs require the gross replacement value of derivatives to be shown on the balance sheet, even when positions are held under master netting agreements with the same counterparty, whereas US GAAP allows netting of exposures.

<sup>8</sup> See BIS, *Quarterly review*, September 2009.

competitive pressures in lending markets, all contributed to higher revenues from core banking business. In this environment, net interest income, expressed as a percentage of assets, increased from 1.41% in the first quarter of 2009 to around 1.50% in both the second and third quarters.<sup>9</sup> As a percentage of total assets, trading income increased from -0.30% in the first quarter to around 0.20% in the second and third quarters of 2009. Finally, revenues from fees and commissions held up remarkably well throughout the financial turmoil: the ratio to assets remained at around 0.50%. Supporting this source of income more recently was a surge in the underwriting fees large banks were able to reap from their capital market and corporate finance activities, mostly reflecting buoyancy in the issuance of debt securities by governments and by non-financial corporations, against a background of tighter bank lending standards.

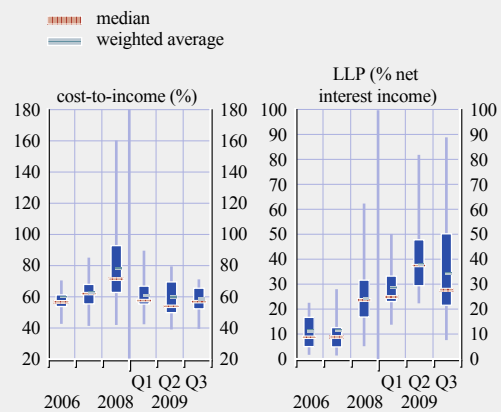
### LCBG COSTS

Since the beginning of the financial turmoil, euro area LCBGs have taken decisive steps to cut costs by reducing headcounts, exploiting synergies in activities and selling non-core assets and businesses. Costs-income ratios, although an imperfect measure of cost efficiency because they fall when incomes rise, declined across the board in the first three quarters of 2009 (see Chart 4.4). For the sub-sample of banks for which quarterly data are available, the median and mean costs-income ratios fell to 56.6% and 58.4% respectively in the third quarter of 2009. While LCBGs' costs as a proportion of net income have returned to levels in recent quarters that were more in line with historical experience, it is important to bear in mind that there are limits in the extent to which profitability can be boosted through cost-cutting.

Turning to credit costs, a serious drag on euro area LCBGs' profits in 2007 and 2008 were provisions for impaired assets. While they initially related mainly to securitised loans, the share of loan impairments started to grow (see Chart 4.4, right-hand side). In particular, most institutions reported sharply higher provisions for loan losses. Moreover, expressed

**Chart 4.4 Euro area large and complex banking groups' cost-to-income and loan-loss provisioning ratios**

(2006 – Q3 2009; maximum, minimum and inter-quartile distribution)



Sources: Individual institutions' financial reports and ECB calculations.   
 Note: Outliers were removed from both charts.

as a percentage of total loans, loan loss provisions were higher by the third quarter, than in any of the five preceding years. This is indicative of the extent of the deterioration in the creditworthiness of households and firms, against the background of a challenging macro-financial environment.<sup>10</sup> The rapid increase in provisions indicates that a renewed wave of write-downs on euro area banks' assets could be in the pipeline (see Box 10). In this connection, a major risk that remains is the large concentration of legacy assets in some LCBGs' balance sheets (see Section 4.2).

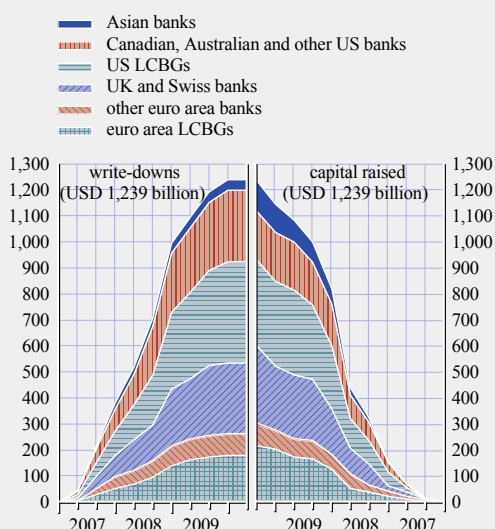
In the first three quarters of 2009, the flow of new write-offs absorbed by global banking systems stabilised (see Chart 4.5). An important reason for this was a recovery in the prices of some of the troubled securities and underlying

<sup>9</sup> It should be noted that interest income from bond holdings (especially government bonds) is included in net interest income. As discussed in Section 4.2, the growth of long-term debt securities accelerated in early 2009 as MFIs stepped up their purchases of government debt securities.

<sup>10</sup> It should be borne in mind that, under the IFRS accounting standards, provisions require material evidence of asset impairment.

**Chart 4.5 Bank write-downs and capital injections across regions**

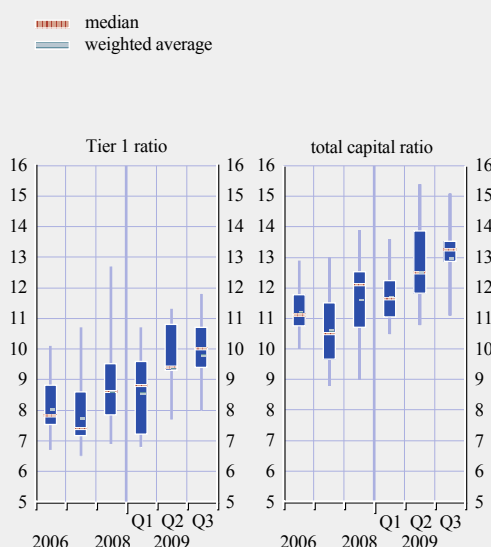
(as at 26 November 2009; USD billions)



Sources: Bloomberg and ECB calculations.  
Note: The latest observation does not include the full sample of banks.

**Chart 4.6 Euro area large and complex banking groups' Tier 1 and total capital ratios**

(2006 – Q3 2009; percentage; maximum, minimum and inter-quartile distribution)



Sources: Individual institutions' financial reports and ECB calculations.

assets. This, together with the improvement of earnings, reduced the need for banks to raise new equity to compensate for the capital erosion resulting from the impairment of assets (see Chart 4.5).<sup>11</sup>

### LCBG SOLVENCY

The recovery in LCBGs' earnings, together with a slowdown in the growth of both risk-weighted and total assets, as well as increases in capital both from public and private sources, contributed to an increase in the median regulatory capital ratio of these institutions (see Chart 4.6).<sup>12</sup> Moreover, those institutions with the lowest regulatory capital ratios still had capital buffers in the third quarter that comfortably exceeded the minimum requirements. So far, those institutions that reported the largest increases in loan-loss provisions are also among those with the highest capital buffers. While this partly mitigates the solvency risks originating from

deteriorating asset quality going forward, it cannot be excluded that institutions with relatively low capital buffers may yet face market pressure to raise additional capital the quality of their assets should take a turn for the worse.

Regarding the quality of LCBG capital, only eight of these institutions disclose a sufficient amount of information to allow comparisons to be made over time. Among these institutions, the amount and composition of capital showed marked improvements between December 2008 and June 2009 (see Table 4.1). In absolute amounts, their total capital increased by €24 billion (or 8%).

<sup>11</sup> Endeavours by banks to raise capital are not only made to cover past write-downs, but also have a forward-looking element.

<sup>12</sup> Total assets fell by 4% in the second quarter of 2009 and rose by 1% in the third, while risk-weighted assets increased by 1% and fell by 2.5% in the respective periods. This divergence can possibly be explained by adverse rating migration in portfolios under the internal ratings-based (IRB) approach.

As a consequence of the recent financial turmoil, market participants have put pressure on banks to raise the share of core Tier 1 capital in the total. This has been reflected in the fact that most of the recent increases in capital can be attributed to the issuance of common equity (an increase of €33 billion or 14%). However, allowing for regulatory and other deductions, this translated into a 7% increase in core Tier 1 equity. Increases in “lower” Tier 2 capital have also been important: this type of capital increased by €7 billion.

Hybrid capital, which has both equity and debt features, increased by 8% over the same period and accounted for slightly more than 20% of Tier 1 capital by June 2009. Hybrid capital

has recently come under regulatory scrutiny, especially among those banks that received state support. In order to protect the level playing field, to avoid moral hazard concerns and to limit the fiscal costs of government aid, banks that have received support have been prevented from paying coupons on hybrids. This has resulted in some uncertainty for the holders of these bonds, which include insurance companies as important players. Non-affected banks, on the other hand, have increased their share of hybrids, as the instruments concerned offer attractive returns for investors and have advantages for banks as regards the cost of capital and flexibility to convert hybrid capital into common equity when deemed appropriate.

**Table 4.1 Capital composition of a sub-set of euro area large and complex banking groups**

| (EUR billions)                         |               |              |          |
|----------------------------------------|---------------|--------------|----------|
|                                        | December 2008 | June 2009    | % change |
| Equity base                            | 233           | 266          | 14       |
| Minority interests                     | 14            | 13           | -2       |
| <i>as % of Tier 1</i>                  | 6.0%          | 5.4%         |          |
| Deduct goodwill and other intangibles  | -59           | -76          | 28       |
| Regulatory deductions                  | -8            | -11          | 33       |
| <b>Core Tier 1 capital</b>             | <b>179</b>    | <b>191</b>   | <b>7</b> |
| Total hybrid                           | 48            | 52           | 8        |
| <i>as % of Tier 1</i>                  | 21.2%         | 21.4%        |          |
| o/w innovative hybrid                  | 2             | 1            | -39      |
| <i>as % of Tier 1</i>                  | 0.7%          | 0.4%         |          |
| <b>Tier 1 capital</b>                  | <b>227</b>    | <b>244</b>   | <b>7</b> |
| Lower Tier 2                           | 87            | 94           | 8        |
| Upper Tier 2                           | 2             | 3            | 18       |
| Tier 3                                 | 1             | 1            | 0        |
| Regulatory deductions                  | -7            | -8           | 12       |
| Other                                  | 2             | 2            | -6       |
| <b>Supplementary capital</b>           | <b>85</b>     | <b>92</b>    | <b>8</b> |
| Regulatory deductions                  | -4            | -2           |          |
| Other adjustments                      | 0             | 0            |          |
| <b>Total regulatory capital</b>        | <b>309</b>    | <b>333</b>   | <b>8</b> |
| <b>Total risk-weighted assets</b>      | <b>2,492</b>  | <b>2,608</b> | <b>5</b> |
| Consolidated total assets              | 8,536         | 8,260        | -3       |
| Tangible assets                        | 8,477         | 8,184        | -3       |
| Core Tier 1 ratio                      | 7.2%          | 7.3%         |          |
| Total capital ratio                    | 12.4%         | 12.8%        |          |
| Equity/assets                          | 2.7%          | 3.2%         |          |
| Tangible common equity/tangible assets | 2.1%          | 2.3%         |          |

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

Notes: Data pertain to eight LCBGs that provide sufficiently detailed information on the composition of capital in their interim reports. Percentage changes were calculated from unrounded data.

## 4.2 BANKING SECTOR OUTLOOK AND RISKS

### EARNINGS RISKS

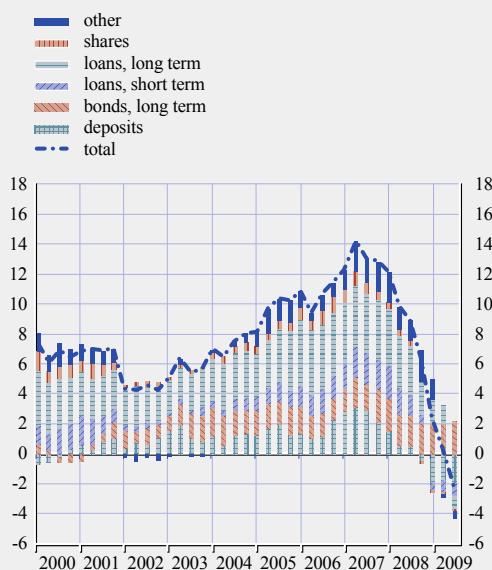
As long as the euro area yield curve remains relatively steep, the net interest income earned by euro area LCBGs will probably be supported by maturity transformation activities, including carry trade. That said, the slowdown in the growth rate of euro area banks' assets may not augur well for the medium-term outlook for earnings. Non-consolidated data for the entire euro area monetary financial institution (MFI) sector show that, after a nearly uninterrupted period of accelerating annual growth of MFI sector financial assets from 2003, the trend was abruptly broken by the financial turmoil in the third quarter of 2007 (see Chart 4.7). Declines in the annual growth rates of asset transactions were most visible for short-term loans and deposits, as well as for liquid assets such as quoted shares and mutual fund shares.<sup>13</sup> By contrast, the annual growth rates of debt securities and, until early 2009, long-term loans held up better.

The sharp deceleration in the growth of short-term loans partly reflected the fact that these instruments often carry higher risk weights, especially if they are not collateralised. Limiting growth in the acquisition of these assets thus allows banks that are in a process of deleveraging to slow the expansion of their risk-weighted assets more quickly. Looking ahead, the extent to which growth in these assets recovers will be more dependent on the recovery in banks' risk-taking capacity, which itself is dependent on the future macro-financial environment.

While the slowdown in the growth of bank lending appears primarily to have been driven by reduced funding needs of non-financial sectors, given the deterioration in the euro area macro-financial environment after late 2008, banks have also been tightening the conditions they apply in the extension of new loans. The results of the ECB bank lending surveys of July and October 2009 indicate that banks continued to tighten their credit standards further (see Chart 4.8). According to the banks

Chart 4.7 Euro area MFI sector's financial assets transactions

(Q1 2000 – Q3 2009; percentage change per annum; contribution in percentage points)



Source: Euro area accounts.

Note: The figures for Q3 2009 are estimates on the basis of the available MFI balance sheet data.

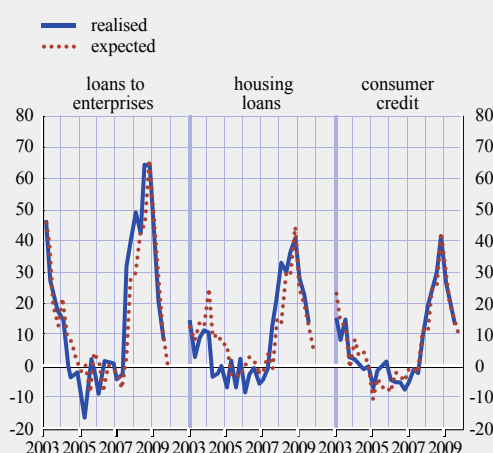
surveyed, factors contributing to the further tightening of credit standards were expectations regarding general economic activity and sector-specific outlooks and, to a lesser extent, supply-side constraints related to banks' access to funding and balance sheet constraints. While the recent pace of tightening represented a slowdown across all loan types, the cumulated net tightening since late 2007 still constitutes a significant overall tightening of credit standards.

The slower growth of LCBGs' assets, together with an expected deterioration in the quality of assets they already hold, especially loans, suggests that the future net interest and investment

13 The contraction in the growth rate of the deposits of MFIs mainly reflects the squeeze in the interbank market and, in particular, the withdrawal by euro area MFIs of short-term deposits they had placed with non-resident banks and other counterparties in the rest of the world. As cross-border interbank activity gradually recovers, at least in the secured segment, it can be expected that the growth of these assets will also resume, contributing positively to future earnings capacity.

**Chart 4.8 Changes in credit standards for loans or credit lines to enterprises and households**

(Q2 2003 – Q4 2009; net percentages of banks contributing to tightening standards)



Source: ECB.

earnings capacities of these institutions are likely to be diminished and contained. Consistent with this, market expectations of the growth in euro area bank earnings per share are relatively modest for 2010 (see Chart S109). Given the fragilities implied by this outlook, an unexpected flattening of the yield curve, for instance, might imply a setback for the recent improvement in the financial performances of LCBGs. From the perspective of future earnings and capital generation, it is crucial that those LCBGs that are saddled with the largest impaired loan and securities portfolios take decisive steps to dispose these assets, especially in cases where their funding is heavily reliant on existing public support schemes.

### CREDIT RISKS

The annual reports of euro area LCBGs for 2008 provide the most up to date publicly available data on their loan exposures. Comparing exposures at the end of 2008 with those at the end of 2007, some changes took place. Notable changes included a decline of around 5% in exposures towards the consumer cyclical sector, a decline of around 2% in banking sector exposures and an increase of about 5% in exposures towards “other” non-financial corporations. As regards the

geographic distribution of loan exposures among euro area LCBGs, on average, around 57% of the loans extended by LCBGs at the end of 2008 were to borrowers located in euro area countries. At the same time, on average, around 9% of total lending was to borrowers in emerging market economies (EMEs), 8% to borrowers residing in North America and 25% to borrowers in the rest of the world (RoW), which includes lending to non-euro area EU countries and countries in emerging Europe.

### Household sector credit risks

Over the past six months, the credit quality of euro area LCBGs’ loans to households deteriorated further on account of the worsening labour market conditions. This was reflected, for instance, in the continued tightening by banks of lending standards on both housing loans and consumer credit. Looking forward, although expectations for labour market conditions are not as pessimistic as six months ago, household sector credit risks are still likely to increase further (see Section 2.4). That said, an improvement in the macroeconomic outlook would most likely contribute to mitigating household sector credit risks.

While the euro area unemployment rate is expected to increase in 2010, the deterioration in labour market conditions is not expected to be evenly spread across all euro area countries. For euro area LCBGs with loan portfolios that are well diversified geographically, this may help to mitigate some of the risks connected with rising unemployment. A further factor mitigating household sector credit risk is the past decline in short-term interest rates. This has had positive effects on the ability of households to service their debts, in particular in countries where mortgages are predominantly granted at a variable interest rate.

In judging banks’ credit risk exposure on account of mortgage lending, an important element is the ratio of the residual amount outstanding on the loan to the value of the collateral, i.e. what is commonly known as the loan-to-value (LTV) ratio. This ratio can be

important in determining the loss a bank might be expected to face in the event of a default where, ordinarily, the collateral would be repossessed and ultimately sold by the bank. In the absence of precise data, at the aggregate level, inferences about possible trends in country-level LTV ratios can be obtained by comparing the stock of mortgage debt outstanding with a house price index.<sup>14</sup> The median of indices based on the amounts of mortgage debt outstanding and residential property prices for each euro area country increased steadily over the two years up to the end of 2008 (see Chart 4.9). A combination of moderate house price inflation, or outright decreases in house prices in several countries, and broadly stable mortgage debt stocks has led to sizeable increases in this index in some cases. There are also indications that these ratios increased further in some countries in 2009. In cases where house prices fall below the value of the loan (i.e. when the LTV ratio rises above one) this would tend to push up the expected loss that exposed banks would face in the event of a borrower's default. That said, while a rise in the LTV ratio may adversely affect households' ability or incentives to

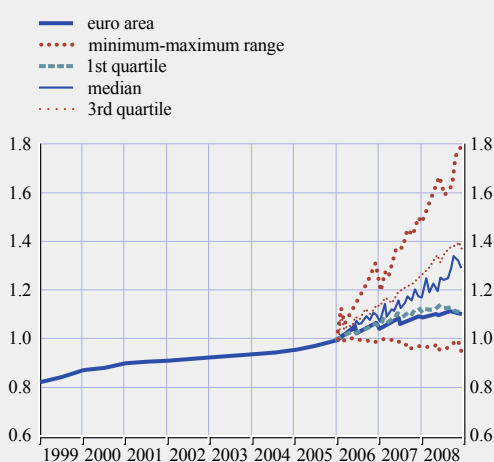
honour their debts, the likelihood of default will ultimately depend on a number of factors.<sup>15</sup>

### Corporate sector credit risks

Corporate sector credit risks increased further in the second half of 2009, primarily because of weak profitability (see Section 2.2). This, together with high and rising leverage ratios, has underpinned expectations of rising rates of default. The deterioration in the macro-financial environment also exposed vulnerabilities among small and medium-sized enterprises (SMEs) in the euro area, including the reliance of these firms on bank funding. Concerns about potentially greater credit risks facing the SME sector had been reflected in a progressive tightening of lending standards throughout the financial turmoil, as indicated by ECB bank lending surveys. Although the overall degree of tightening was not significantly different to that applied to loans extended to large firms, SMEs still face greater funding risks because they are not usually able to finance themselves in capital markets. There is also a concern that banks may not have set aside sufficient capital to absorb unexpected losses on loans to SMEs in an environment where default correlations could prove to be relatively high. Under the Basel II framework, for a given loan default probability, loans to SMEs have lower capital requirements than loans to larger corporations. An important reason for this special treatment is the recognition of the fact that the riskiness of SME loan exposures derives mostly from idiosyncratic risk and much less from common factor risk. However, if incidences of SME defaults prove to be more highly correlated than expected on account of a broad-based macroeconomic deterioration, this could test the adequacy of capital buffers, especially in those countries where the size of the SME sector is significant. That said, looking ahead, the improving macroeconomic outlook

**Chart 4.9 Ratio of an index of notional stocks of loans for house purchase to an index of residential property prices in euro area countries**

(Jan. 1999 – Dec. 2008; ratio: Jan. 2006=1)



Sources: ECB and ECB calculations.

Note: In 2008 the sample consists of 13 of the 16 euro area countries.

<sup>14</sup> The calculation of precise country-level LTVs requires micro data on individual loans and the collateral behind each loan. It can thus not be easily inferred from macro data.

<sup>15</sup> The types of factors that would need to be taken into account include the financial positions of households, structural features of the mortgage market (such as the share of buy-to-let mortgages) and legal aspects, etc.

is expected to contribute, to some extent, to mitigating overall corporate sector credit risks.

Another area of concern for LCBGs' loan portfolios is the fragility of the commercial property sector where conditions have deteriorated further over the past six months (see Section 2.3). In some countries, exposures of banking sectors to this sector are relatively large (see Chart 4.10). In addition, exposures within banking sectors are often concentrated on a limited number of institutions. That said, the risks for banks might be more contained in countries where the bulk of commercial real estate investors are not leveraged institutions, but rather institutional investors such as pension funds and closed-end property funds.

Corporate sector credit risks have also continued to rise for LCBGs with significant leveraged loan portfolios. There have been a number of indications of rising distress in the European leveraged loan market since June 2009, including increases in the number and volume of distressed loans (defaults and restructurings). In terms of senior debt at issuance, the cumulated volume of €15 billion of distressed loans recorded from January to April (as reported in

the June 2009 FSR) had expanded to over €37 billion by the end of September 2009.<sup>16</sup>

#### Risks emanating from emerging markets and the new EU Member States

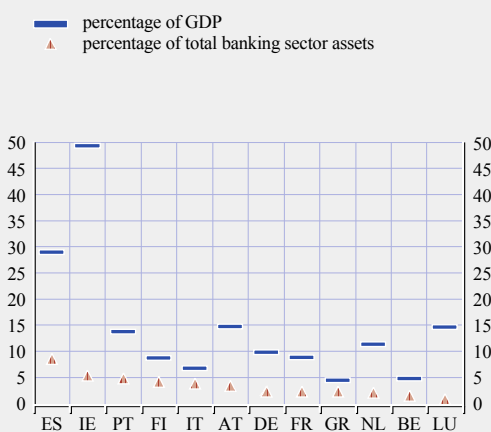
Since the publication of the June 2009 FSR, risks to LCBGs related to their exposures to emerging market economies have decreased, mainly on account of the recovery of investor confidence, which has eased funding conditions somewhat. Although most emerging market economies and the new EU Member States have, strictly speaking, not been in the epicentre of the crisis, their high dependence on external demand and limited room for manoeuvre for monetary and fiscal policies resulted in LCBGs and their subsidiaries in these countries facing increasing credit risks in the course of 2009.

In the period after the publication of the June 2009 FSR, foreign currency claims on the emerging economies and on the new EU Member States decreased significantly (see Chart 4.11). In part, this can be accounted for by the sizeable capital retrenchment by parent banks in the fourth quarter of 2008 in order to strengthen

<sup>16</sup> See Standard & Poor's, "LCD EuroStats", October 2009.

**Chart 4.10 Amounts outstanding of banks' commercial property loans (excluding lending for construction) in selected euro area countries**

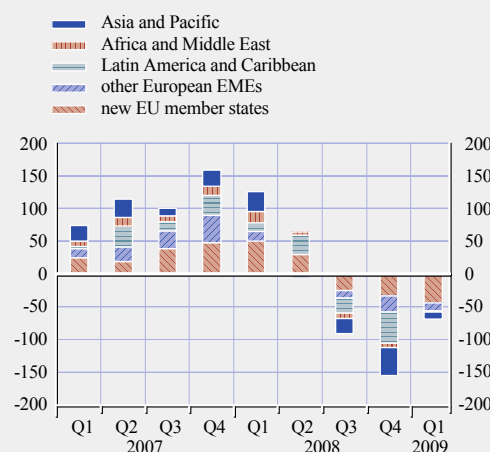
(2008)



Sources: ECB and DTZ Research.

**Chart 4.11 Changes in euro area banks' claims on emerging market economies and new EU Member States**

(Q1 2007 – Q1 2009; EUR millions)



Sources: BIS and ECB calculations.

their own balance sheets against the shock caused by the bankruptcy of Lehman Brothers. Furthermore, parent banks' exposures vis-à-vis central and eastern European (CEE) countries also decreased on account of the generally unfavourable macroeconomic environment, a general slowdown of euro area banks' asset growth and the re-pricing of risk.

In the case of some countries, however, the outflow of funds was associated with a significant contraction in lending, fuelled by a deeper than expected recession. As a result, funding provided by euro area banks to their subsidiaries in these countries was not used for new lending, and was partly repatriated.

In the period ahead, the main risks that euro area LCBGs face with respect to these regions include the possibility of:

- (i) asset deterioration related to a worse than-anticipated macroeconomic slowdown in these regions, together with a possible further correction of real estate prices and the possible unearthing of portfolio

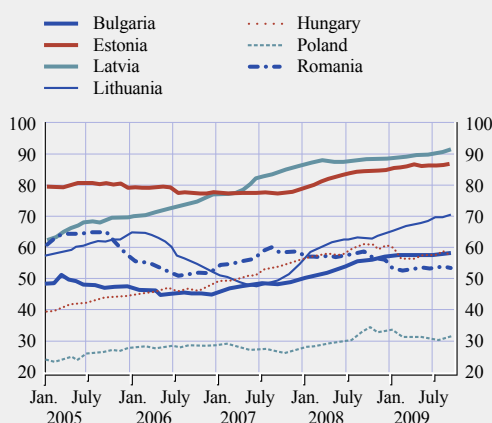
concentration risks and insufficient differentiation across sectors, currencies and geographical entities; and

- (ii) adverse exchange rate developments in countries with flexible exchange rates, which could unearth vulnerabilities created by foreign currency lending practices in some of the new EU Member States (see Section 1.1).

The lending exposures of euro area banks to the new EU Member States and emerging market economies in the first quarter of 2009 remained focused on a few sectors and geographical entities. Market intelligence suggests that sizeable portfolio concentrations could have emerged in LCBGs' mortgage and consumer finance exposures in these countries. In some non-euro area CEE countries, the shares of foreign currency lending have been high and growing (see Chart 4.12), notwithstanding currency market developments in countries with floating exchange rates. The main explanation has been the further widening of interest rate differentials on loans in domestic

**Chart 4.12 Share of foreign currency lending in several new EU Member States**

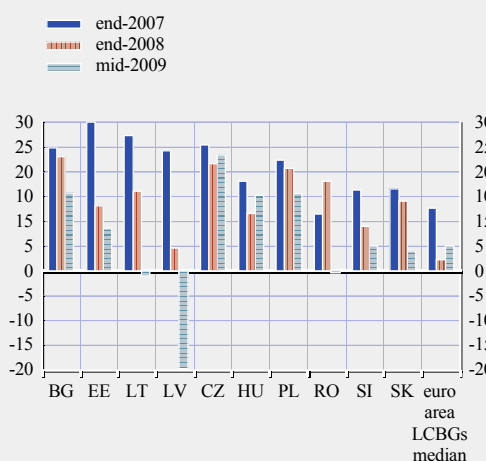
(Jan. 2005 – Sep. 2009; percentage of total loans extended, adjusted for foreign exchange rate effects)



Source: ECB.  
Note: Dashed lines indicate countries with floating exchange rates.

**Chart 4.13 Return on equity of banking sectors in selected new EU Member States**

(percentage)



Sources: IMF and ECB calculations.  
Note: For some countries, data for 2009 is until March 2009 only.

currencies vis-à-vis those in foreign currencies. To the extent that foreign currency risks are not ordinarily hedged by households, this translates into greater credit risks for banks.

The deterioration of borrowers' debt servicing capacity has already been reflected in a rise of non-performing loan (NPL) ratios in new EU Member States, which has adversely affected several euro area LCBGs, mostly through a lowering of their profitability from activities in these countries. Nevertheless, the profitability of banking systems in many CEE countries remained

relatively strong in the first half of 2009, well above the median return on equity of euro area LCBGs (see Chart 4.13). Wide interest margins have ensured strong core income-generating capacities in these banking systems, while the capital positions of subsidiaries are generally assessed as being sufficient to absorb increasing loan losses. Against this background, euro area banks have emphasised their commitment to support their subsidiaries in the new EU Member States and other emerging countries in Europe, and significant injections of capital have taken place in this context.

#### Box 10

##### ESTIMATE OF POTENTIAL FUTURE WRITE-DOWNS ON SECURITIES AND LOANS FACING THE EURO AREA BANKING SECTOR

An estimate of potential write-downs for the period from the beginning of 2007 until end-2010 related to the financial market turmoil for euro area banks was published in the June 2009 FSR, along with the methodology that was used to make the calculations.<sup>1</sup> Using the same methodology and with the benefit of more granular data on loan and securities exposures of euro area banks, this box presents an update of the estimate and assesses, based on new macroeconomic forecasts, the magnitude of potential future write-downs that may be suffered by the euro area banking sector by the end of 2010.<sup>2</sup>

In order to assess the magnitude and the detailed composition of euro area banks' credit exposures, the national central banks of euro area countries, with the coordination of the ECB, conducted two data collection exercises. The information collected facilitated greater granularity on euro area banking sector exposures, so that loss rates could be computed in a way that better account is taken of the type of assets, the underlying collateral and the geographical area of origination. The new estimates have also been enhanced with the inclusion of an estimate of potential write-downs on euro area banking sector exposures to securities originated in central, eastern and south-eastern Europe (CESEE).<sup>3</sup> The estimate of write-downs on securities published in the June 2009 FSR was based only on securities originated in mature Europe and in the United States. The loss rate applied to CESEE securities in the new estimates was approximated on the basis of changes in the Emerging Market Bond Index (EMBI).

Regarding the granularity of the data on exposures used to make the new estimate of potential write-downs on loans, exposures to residents of the United States, the euro area and CESEE countries were all modelled separately. While the models used to produce forecasts of write-off rates were

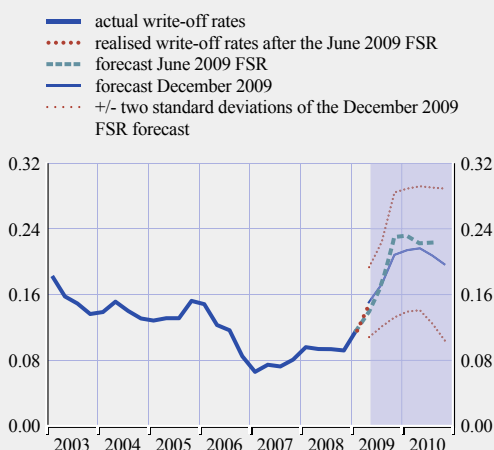
1 See Box 14, entitled "Estimating potential write-downs confronting the euro area banking sector as a result of the financial market turmoil", in ECB, *Financial Stability Review*, June 2009

2 The reader should be aware of caveats and the uncertainties surrounding the estimates that were described in the box in the June 2009 FSR (see previous footnote for reference) before interpreting the magnitude of the estimate of potential losses.

3 The figure includes exposures to the ten new Member States and to Croatia, Serbia, Russia, Turkey and Ukraine.

**Chart A Write-off rates on household mortgages extended by euro area banks**

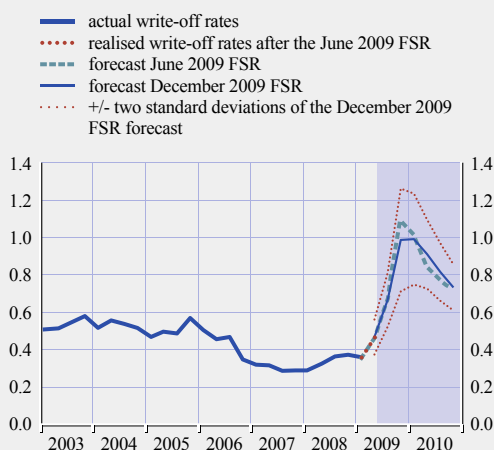
(Q1 2003 – Q4 2010; percentage)



Sources: ECB and ECB calculations.

**Chart B Write-off rates on loans extended to corporates by euro area banks**

(Q1 2003 – Q4 2010; percentage)



Sources: ECB and ECB calculations.

the same as those used to prepare the estimates that were published in the June 2009 FSR, the paths predicted for GDP growth and the unemployment rate were both updated in accordance with the latest European Commission macroeconomic forecast published in November 2009. Since the European Commission forecast for the euro area did not change materially when compared with the figures published in May, this meant that the predicted write-off rates on loans changed little in comparison with those used in the June 2009 computations (see Charts A and B). Nevertheless, compared with the estimates published in June, the new loan loss estimates have increased for two main reasons. First, because provisions were made in 2008 for potential losses on some loans that had not so far been written off, an upward adjustment was made to the relevant write-off rate to account for the fact that some of these loans may eventually be written off.<sup>4</sup> Second, the new estimates cover a broader range of exposures than was the case in June. In particular, they take better account of the magnitude of potential write-downs on euro area banking system exposures to collateralised debt obligations (CDOs) and residential mortgage-backed securities (RMBSs).

The new estimates show that the total (i.e. already reported and yet to come) write-downs for the euro area banking system are likely to amount to around €553 billion for the period 2007-10. Of this total, cumulative total write-downs on exposures to securities are likely to amount to around €198 billion, while the predicted figure for total loan-losses is around €355 billion (see the table). According to the consolidated banking statistics, euro area banks made provisions of €121 billion in view of the deterioration in the quality of their loan exposures between 2007 and 2008. In addition, figures reported by a sample of LCBGs for loan-loss provisions in the first half of 2009 show an acceleration when compared with 2008. An estimate for the entire euro area banking sector based on these provisioning patterns suggests that the total could amount to around €65 billion. At the same time, write-downs on securities reported by banks up to the end of October 2009 amounted to about €180 billion. Splitting the total loss figures into what has already been reported and what

4 The proportionality factor used to adjust for this was based on the average ratio of write-offs to provisions in the period from 2006 to 2008. The increase of this proportion in 2008 may be an indication that relatively more loans, most likely collateralised with mortgages, were being kept on banks' balance sheets after provisioning had been made, possibly with the expectation that some of these loans might start performing again once the economy starts to recover.

## Potential write-downs on securities and loans for the euro area banking sector over the period from 2007 to 2010

(EUR billions)

|                                                                                               | Estimated exposure | Cumulative implied write-downs |                   | Estimated loss rate (%) |
|-----------------------------------------------------------------------------------------------|--------------------|--------------------------------|-------------------|-------------------------|
|                                                                                               |                    | June 2009 FSR                  | December 2009 FSR |                         |
| <b>Cash and synthetic structured credit securities</b>                                        |                    |                                |                   |                         |
| Residential mortgage-backed securities (RMBSs)                                                | 444                | 46.6                           | 55.7              | 12.5                    |
| Asset-backed securities (ABSs)                                                                | 191                | 4.5                            | 3.6               | 1.9                     |
| Collateralised debt obligation (CDOs) backed by ABSs/RMBSs                                    | 145                | 68.4                           | 83.6              | 57.7                    |
| Commercial mortgage-backed securities (CMBSSs)                                                | 79                 | 14.3                           | 20.2              | 25.6                    |
| Collateralised loan obligations (CLOs)                                                        | 231                | 8.3                            | 5.7               | 2.5                     |
| Asset-backed commercial paper (ABCP)                                                          | 12                 | -                              | 0.2               | 1.7                     |
| Corporate CDOs                                                                                | 20                 | -                              | 0.3               | 1.7                     |
| <b>Total for cash and synthetic structured credit securities</b>                              | <b>1,122</b>       | <b>142</b>                     | <b>169</b>        | <b>15.1</b>             |
| <b>Other security holdings</b>                                                                |                    |                                |                   |                         |
| Corporate debt securities                                                                     | 255                | -                              | 6.2               | 2.4                     |
| Covered bonds                                                                                 | 150                | -                              | 0.0               | 0.0                     |
| Bank bonds                                                                                    | 660                | -                              | 0.0               | 0.0                     |
| Equity holdings                                                                               | 157                | -                              | 3.8               | 2.4                     |
| Securities issued in central, eastern and south-eastern Europe                                | 263                | -                              | 12.8              | 4.9                     |
| Other securities                                                                              | 231                | -                              | 5.6               | 2.4                     |
| Reconciliation item <sup>1)</sup>                                                             |                    | 21.8                           |                   |                         |
| <b>Total for other security holdings</b>                                                      | <b>1,717</b>       | <b>22</b>                      | <b>28</b>         | <b>1.6</b>              |
| <b>Total for all securities</b>                                                               | <b>2,839</b>       | <b>164</b>                     | <b>198</b>        | <b>7.0</b>              |
| <b>Loans to non-financial customers</b>                                                       |                    |                                |                   |                         |
| Residential mortgages                                                                         | 3,683              | 33.1                           | 44.3              | 1.2                     |
| Consumer loans                                                                                | 1,481              | 46.6                           | 63.8              | 4.3                     |
| Commercial property mortgages                                                                 | 781                | -                              | 37.7              | 4.8                     |
| Corporate loans                                                                               | 5,125              | 172.9                          | 193.5             | 3.8                     |
| Syndicated loans                                                                              | 354                | -                              | 15.7              | 4.5                     |
| Reconciliation item <sup>1)</sup>                                                             | -                  | 71.4                           | -                 |                         |
| <b>Total for all loans</b>                                                                    | <b>11,424</b>      | <b>324</b>                     | <b>355</b>        | <b>3.1</b>              |
| <b>Total potential write-downs on securities and loans</b>                                    | <b>14,263</b>      | <b>488</b>                     | <b>553</b>        | <b>3.9</b>              |
| Write-downs reported to end-May 2009 (June 2009 FSR) and end-October 2009 (December 2009 FSR) |                    | 162                            | 180               |                         |
| Loan loss provisions 2007-2008 <sup>2)</sup>                                                  |                    | 113                            | 121               |                         |
| Estimate of loan loss provisions in H1 2009                                                   |                    | -                              | 65                |                         |
| <b>Potential further write-downs on securities and loans</b>                                  |                    | <b>214</b>                     | <b>187</b>        |                         |

Sources: Association for Financial Markets in Europe, Banking Supervision Committee, national central banks, ECB and ECB calculations.

1) Reconciliation items appear in this table to facilitate comparisons between the June 2009 FSR estimates of potential future write-downs and the latest estimates. This item is added to take account of the fact that a less granular breakdown of exposures by type was provided in the June FSR. For instance, the residual loan category labelled "other loans", shown in the June 2009 FSR, included some exposures that have now been split up and reallocated among the main loan categories shown here. Because of differences in the magnitude of exposures, the figures for predicted write-downs shown here are not fully comparable with the June 2009 estimates for some asset types.

2) Loan loss provisions made by banks in 2007-2008 are somewhat higher than those published in the June 2009 FSR due to revisions to the consolidated banking statistics that were made after the finalisation of the June 2009 FSR.

is yet to come by the end of 2010, there is a potential for euro area banks to suffer an additional €187 billion in losses, mainly as a result of their loan exposures.

The new estimate of the total write-downs facing the euro area banking sector is higher than the amount of €488 billion (or USD 649 billion) published in the June 2009 FSR.<sup>5</sup> In this issue of the FSR, loss estimates are denominated in euro and the increase, expressed in euro terms, in comparison with the June FSR is €65 billion. Apart from the wider

5 In the April 2009 IMF Global Financial Stability Report, a loss estimate of USD 904 billion (€695 billion) was published for the euro area banking sector. Since then, the IMF has revised its estimate considerably downwards, to USD 814 billion (€581 billion). The main reason for the downward revision was a change in the methodology for computing loan loss estimates and a refinement of the estimate of euro area banking sector securities exposures. Since the IMF figures are published in US dollars, exchange rate assumptions must be taken into account when making comparisons between these and ECB loss estimates.

variety of assets included in the latest exercise, an important reason behind the rise is the further deterioration in commercial property market conditions. This has contributed to an upward revision to the estimate of potential write-downs on banks' exposures to commercial property mortgages and commercial mortgage-backed securities. Some caution is warranted in making direct comparisons between the figure for potential write-downs published in the June FSR, €214 billion, and the new estimate of €187 billion. The main reason is that both estimates looked at potential write-downs up to the end of 2010.<sup>6</sup> With the passage of time, the reference period for the latest exercise is six months shorter than the last one, which, *ceteris paribus* and assuming a steady flow of provisioning, should mean a lowering of the figure for potential future write-downs. In the meantime, banks have, as expected, reported additional loan-loss provisions which are now included in the figures for already reported losses. Since there has been only a small decrease in the figure for write-downs in the pipeline until the end of 2010, this means that the remaining losses will have to be buffered with banks' core earnings over a relatively shorter period of time.<sup>7</sup>

6 In the June 2009 FSR, the figure for potential future write-downs related to the period from end-May 2009 until end-December 2010 for securities and from the beginning of 2008 until end-2010 for loans. In this issue of the FSR, the figure for potential future write-downs relates to the period from end-October 2009 until end-December 2010 for securities and from end-June 2009 until end-2010 for loans.

7 The increased intensity of losses for the remainder of the period until end-2010, which had already manifested itself in the acceleration of provisioning in 2009, is mainly related to higher loss rates on loans in 2009. These loss rates are expected to remain at elevated levels in 2010 (see Charts A and B).

### Assessing the resilience of LCBGs' credit portfolios under alternative risk scenarios

The resilience of LCBGs' credit portfolios to different sources of risk can be assessed by examining the impact of low-probability but plausible adverse scenarios of future macroeconomic developments.<sup>17</sup> In the analysis carried out in this sub-section, the focus is on estimated expected and unexpected losses as measured with a credit value-at-risk (VaR).

An important input into any credit risk assessment is the pattern of defaults on the underlying exposures. Within the euro area corporate sector, expected default frequencies – a measure of the probability of default – peaked in March 2009 in the construction, banking, other financial institution, consumer cyclical, media and technology, and utilities sectors. There was a relatively broad-based decline in this measure of credit risk after the publication of the June 2009 FSR, but it still remained at relatively high levels for most sectors in late 2009 (see Chart 4.14).

Apart from the likelihood of default, a further element necessary for assessing credit risk is the amounts that exposed investors may lose in the event of a default, the so-called loss-given-default (LGD) rate. The latest available data indicate that in 2009 all euro area industry sectors have recorded the highest LGD rates since 1996, with the exception of the media and technology sector where this measure remained slightly below the peak of 2002 (see Chart 4.15).

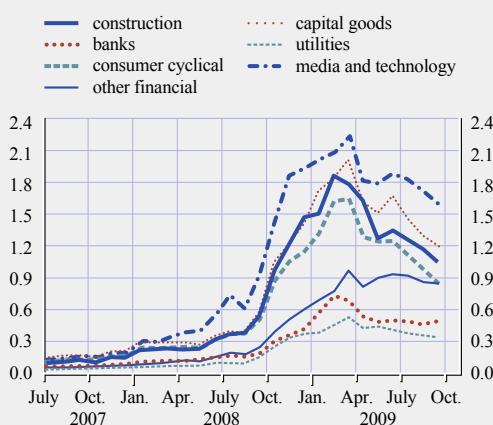
On the basis of these empirical expected-default-frequency (EDF) and LGD measures,<sup>18</sup> and the

17 It is important to note that the exercises described in this section differ from the exercise commissioned by the Economic and Financial Committee (EFC) and coordinated by the Committee of European Banking Supervisors (CEBS) in the summer of 2009 in a number of respects. In particular, both the methodology applied and the composition of banks differs to the CEBS exercise. For more details on the CEBS exercise, see CEBS, Press Release on the Results of the EU-Wide Stress-Testing Exercise, 1 October 2009.

18 Information on exposures towards the household and public sectors are also taken into account, although the LGD rates in these cases are based on survey data.

**Chart 4.14 Unconditional expected default frequencies (EDFs) for selected sectors in the euro area**

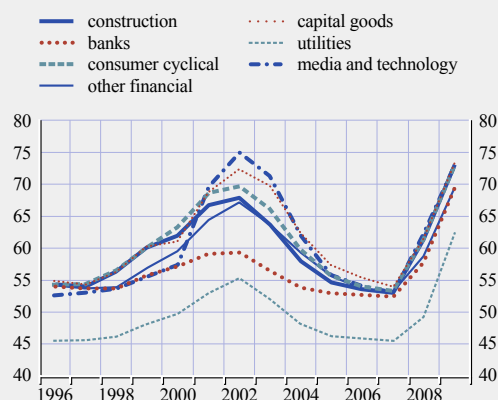
(July 2007 – Sep. 2009; percentage probability; medians)



Sources: Moody's KMV and ECB calculations.  
Notes: The EDF provides an estimate of the probability of default over the following year. Because of measurement considerations, the EDF values are restricted by Moody's KMV to an interval between 0.01% and 35%. The sector "capital goods" covers the production of industrial machinery and equipment.

**Chart 4.15 Unconditional loss-given-default (LGD) rates for selected sectors in the euro area**

(1996 – July 2009; percentage; medians)



Sources: Moody's LossCalc and ECB calculations.  
Note: The sector "capital goods" covers the production of industrial machinery and equipment.

composition of LCBGs' loan portfolios, a baseline scenario for the credit VaR of each euro area LCBG can be calculated.<sup>19</sup> To analyse the sensitivity of the credit VaRs to low-probability but plausible macro-financial shocks, hypothetical adverse scenarios for borrowers' probabilities of default (PDs) were calculated and compared with the baseline scenarios where the PDs remain unchanged.<sup>20</sup> The following scenarios were considered:<sup>21</sup>

- (i) a decrease in the euro area GDP growth rate;
- (ii) an increase in the euro area unemployment rate; and
- (iii) a decrease in euro area commercial property prices;

In each of these scenarios, the shocks to the variable under consideration ultimately feed through to the other macroeconomic variables in the system. In other words, the exercises are not sensitivity tests. Under scenario (i), there is a decrease of 2.7% in the year-on-year growth rate of euro area GDP relative to the fourth quarter of 2009.<sup>22</sup> Under scenario (ii), the euro area unemployment rate increases

by 3.9 percentage points. Finally, in scenario (iii), the year-on-year euro area commercial property price inflation rate is 10.2% lower than in the baseline.<sup>23</sup>

19 For the methodology that is applied in this analysis, see ECB, "Global macro-financial shocks and corporate sector expected default frequencies in the euro area", *Financial Stability Review*, June 2007; ECB, "Assessing portfolio credit risk in a sample of euro area large and complex banking groups", *Financial Stability Review*, June 2007; ECB, "Assessing credit risk in the loan portfolios of euro area large and complex banking groups", *Financial Stability Review*, December 2007; and O. Castrén, T. Fitzpatrick and M. Sydow, "Assessing portfolio credit risk changes in a sample of EU large and complex banking groups in reaction to macroeconomic shocks", *ECB Working Paper Series*, No 1002, ECB, February 2009.

20 Since the composition of banks' loan books tends to change relatively slowly over time, the assumption of constant loan portfolio compositions over the scenario horizons is not unreasonable.

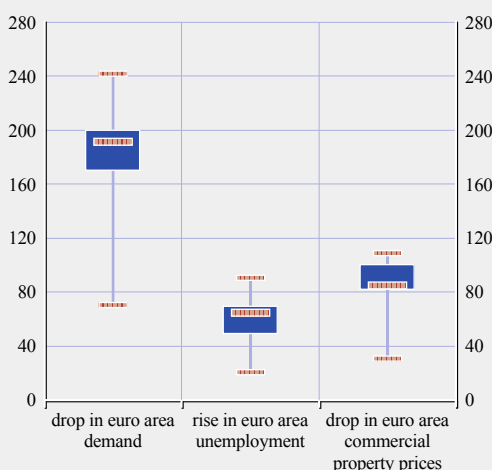
21 It should be noted that all of these scenarios are different from those applied in the recent EFC/CEBS exercise.

22 The scenarios were obtained by using the maximum of the lower 95% confidence bound of a simple univariate multi-step forecast for the relevant variable over the following four quarters. This means that, according to the model used, the scenario has a 2.5% probability of materialising by December 2010.

23 These figures refer to the maximum changes, between the start and the end point of the stress horizon, in the relevant variables relative to the observation in the fourth quarter of 2008, the latter being the reporting date of the loan exposure data.

**Chart 4.16 Changes in one-year ahead credit VaRs under different scenarios relative to the baseline scenario across euro area large and complex banking groups**

(percentage change; maximum, minimum, interquartile distribution and median)



Sources: Individual institutions' financial reports and ECB calculations.

Mapping the effects of the three scenarios for borrower PDs to the individual LCBG's credit VaRs shows that changes in credit VaRs relative to the baseline scenario are rather heterogeneous across both scenarios and individual LCBGs.<sup>24</sup> An unexpected decrease in the year-on-year growth rate euro of area GDP would have the strongest impact on the LCBGs' median credit VaR over a horizon of one year (see Chart 4.16). The scenario involving a drop in euro area commercial property prices would have the second greatest impact, whereas an unexpected rise in the euro area unemployment rate would have the smallest impact, among the scenarios considered. In the case of some individual institutions, the increases can be quite large, reflecting the composition of loan books and their exposures to particular types of stress.<sup>25</sup>

For those LCBGs for which the baseline credit VaRs are the highest – i.e. those institutions whose loan books show the highest risk profiles – some of these low-probability scenarios could, if they were to materialise, imply some erosion of their capital buffers. In addition, should several of the above scenarios materialise

simultaneously, the outcomes would be more severe for most euro area LCBGs.

### MARKET-RELATED RISKS

Since the finalisation of the June 2009 FSR, there has been a relatively broad-based decline in market-related risks for euro area LCBGs. Signs of improvement are related to drops in volatility across a number of different asset classes where euro area LCBGs have trading and investment exposures.

The short-term equity portfolio risks of LCBGs largely depend on expected changes in equity market volatility. These expectations can be approximated by the implied volatility derived from options on the Dow Jones EURO STOXX 50 equity index. This measure of expected volatility in the euro area equity markets declined to levels below 30% in the second half of 2009, down from the 40-50% range in which it oscillated in late 2008 and early 2009 (see Chart 4.17).

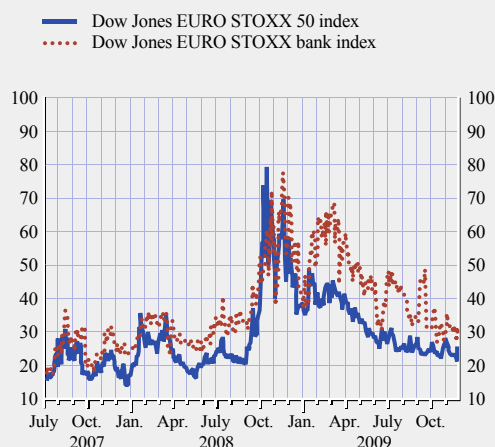
Interest rate risks broadly declined after the publication of the June 2009 FSR, although perceptions of risk remained higher at the short end of the euro area term structure than at the long. In particular, despite the further easing of stresses in the euro area interbank market (see Section 3.1), implied volatility of euro area short-term interest rates still remained very high (see Chart S71). However, there was

24 The mapping process is based on a bivariate vector autoregressive estimation framework that incorporates PDs and the respective macro factor under stress. It is important to note that, in the scenario covering an increase in euro area commercial property prices, all borrower-specific PDs increase, and not only those of the construction sector. The same mechanism is applied in the context of the other two scenarios.

25 It should be noted that these estimates can be sensitive to the specific confidence level chosen. Moreover, they do not account for any hedging of the credit risk exposures, nor do the results incorporate any assumptions about future earnings capacity or government support that would offset part of the losses. The reported figures therefore represent the "pure" stress impact in the absence of any mitigating factors and should thus be seen as representing an upper bound to the credit risk these institutions could be exposed to. This differs from what was done in the recent EFC/CEBS exercise and in the US SCAP exercise, in which future earnings capacity was also calculated and taken into account as a mitigating factor.

**Chart 4.17 Implied volatility of the Dow Jones EUROSTOXX 50 equity and bank indices**

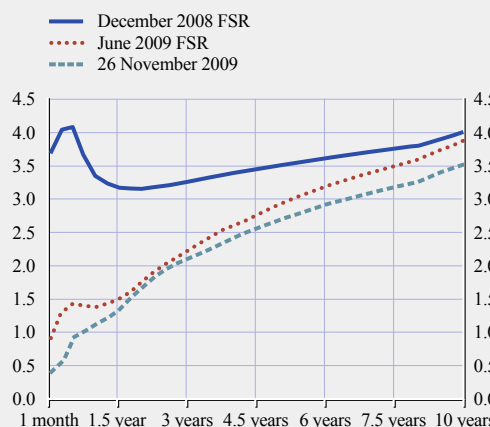
(July 2007 – Nov. 2009; percentage)



Source: Bloomberg.

**Chart 4.18 Euro area yield curve**

(percentage)



Source: ECB.

a notable decline in implied volatility at the long end of the yield curve (see Chart S74). At the same time, the declines in both short and long-term market rates contributed to a parallel downward shift in the euro area yield curve, which nevertheless remained very steep (see Chart 4.18). While the steepness of the euro area market yield curve has supported revenues from LCBGs' maturity transformation activities, as was discussed in Section 4.1 above, an unexpected flattening of the curve would probably imply a setback for LCBG financial performances.

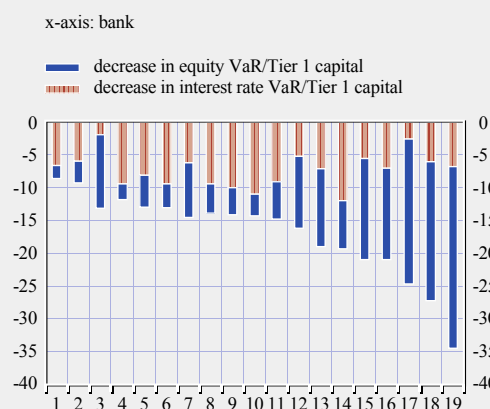
Euro area LCBGs typically only report their market value-at-risk (VaR) figures annually. If the composition of their market sensitive portfolios remained fixed at end-2008 levels, then the declines in equity and interest rate volatility that took place up to the cut-off date of this FSR should have translated into significant reductions in their market VaRs, especially for those institutions with large exposures towards equity instruments (see Chart 4.19).<sup>26</sup> These approximated falls in market VaRs would, in turn, correspond to reductions in the amount of capital needed to cover market risk exposures. That said, some caution is needed in assessing this indicator because market intelligence

suggests that the fall in financial asset volatilities after March 2009 induced many financial institutions to raise their securities exposures, and thus their market VaRs.

26 These figures are likely to represent upper bounds for estimates, since the exposures, at least in the equity portfolios, also declined in many cases (see Chart 4.13).

**Chart 4.19 Changes in interest rate and equity VaRs for euro area large and complex banking groups**

(percentage of reported market VaR end-2008)



Sources: Individual institutions' financial reports and ECB calculations.  
 Note: Volatility difference was measured between end-2008 and the cut-off date.

The way in which market risks translate into the financial performances of individual financial institutions depends not only on the size and composition of market risk exposures, but also on the manner in which these exposures are classified for accounting purposes. In some countries, the share of financial assets held for trading purposes is substantially higher than the share of available-for-sale securities (see Chart 4.20).<sup>27</sup> The valuation of assets classified as held for trading tends to depend on banks' internal valuation models to a greater extent than assets classified as available for sale.<sup>28</sup> Hence, financial asset portfolios with larger amounts of assets held for trading may be less sensitive to market developments.

### Counterparty risks

Since the finalisation of the June 2009 FSR, concerns about counterparty credit risk appear to have diminished considerably. One indication of this has been the lowering of the cost of protection against the possibility of defaults among major dealers in the over-the-counter (OTC) derivatives markets, as reflected in CDS

spread patterns (see Chart 4.21). Undoubtedly, the financial sector support by governments played an important role in reducing this risk, as did the improvement in the macro-financial outlook.

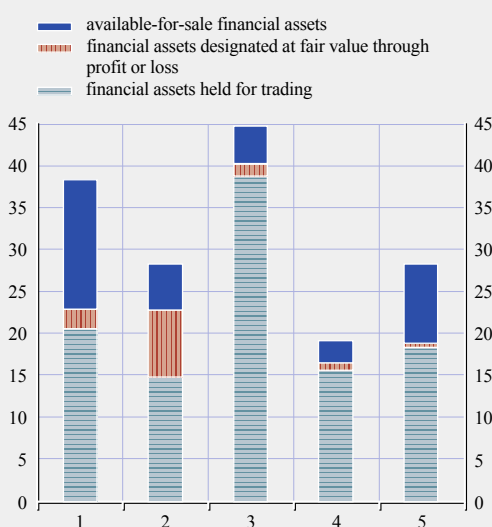
Owing to lower counterparty credit risk perceptions, banks are no longer tightening credit terms, but they do not, as yet, seem to be loosening them either. If the macro-financial outlook continues to improve, some reversal might be expected, especially if competitive pressures begin to intensify. However, it is unlikely that structured credit paper and other types of complex securities will soon again be accepted as collateral. Other factors that can affect the availability of financing include eligible counterparty lists and counterparty

27 Within the assets held for trading purposes, in particular securities and derivatives values are calculated on the basis of either external sources (e.g. from prices quoted on stock exchanges or other price providers like Reuters) or market prices determined by using internal valuation models (marking-to-model).

28 Assets classified as available for sale are measured at fair value and any valuation changes are recognised in shareholders' equity.

**Chart 4.20 Accounting classification of the financial assets of banks across selected countries**

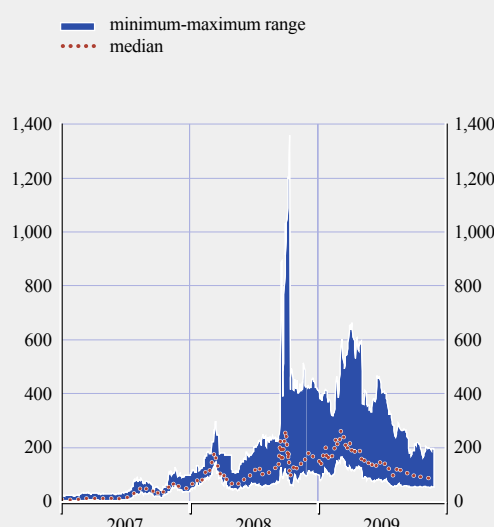
(2008; percentage of total assets)



Source: Banking Supervision Committee.

**Chart 4.21 Dispersion of CDS spreads of selected major European and US dealers in OTC derivatives markets**

(Jan. 2007 – Nov. 2009; basis points; senior debt; five-year maturity)



Sources: Bloomberg and ECB calculations.  
Note: The dispersion analysis includes 12 major dealers.

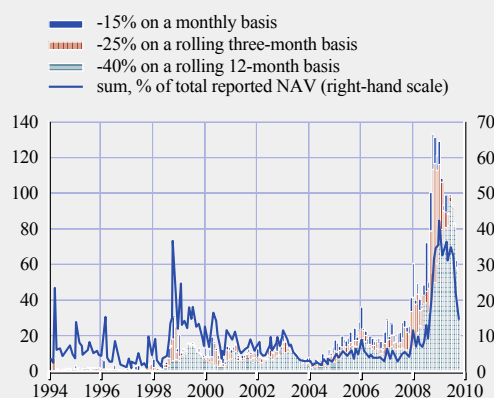
credit limits, but they may take some time to change. Hence, any softening of financing conditions is likely to begin with less strict secured lending terms. This may involve a lengthening of financing maturities and, perhaps, lower haircuts.

It is noteworthy that some counterparties seem to be willing to minimise the role of external credit rating-based triggers used in agreements governing OTC derivatives trading. At the same time, there also appear to be widespread moves towards a combination of low minimum transfer amounts, zero loss thresholds (meaning that any positive marked-to-market credit exposure in excess of a minimum transfer amount will generate a variation margin call), and daily variation margin cycles where these are not yet in place. The latter three measures could potentially replace external credit rating-based and other similar provisions that confer rights to one-off requests for additional collateral during the life of an OTC derivatives transaction, if an assessment could be made that such combination of margining practices provides adequate protection against a decline in the credit quality of a counterparty. Banks and securities lenders are also seeking better control over, and an improved monitoring of, both received and submitted collateral.

For banks, hedge funds are important and usually very active leveraged non-bank counterparties in both securities financing transactions and trades in OTC derivatives. As described in Section 1.3, conditions in the hedge fund sector have been improving recently, and this should result in lower counterparty credit risks for banks. Since the finalisation of the June 2009 FSR, the estimated proportion of hedge funds breaching triggers of cumulative total decline in net asset value (NAV) has decreased, but it still remained at relatively elevated levels.<sup>29</sup> Indeed, the proportion of hedge funds in this situation was not much lower than that prevailing after the near-default of LTCM in September 1998 (see Chart 4.22).

**Chart 4.22 Estimated total net asset value (NAV) and proportion of hedge funds breaching triggers of cumulative total NAV decline**

(Jan. 1994 – Oct. 2009; USD billions and percentage of total reported NAV)



Sources: Lipper TASS database and ECB calculations.

Notes: Excluding funds of hedge funds. NAV is the total value of a fund's investments less liabilities; it is also referred to as capital under management. If several commonly used total NAV decline triggers were breached by an individual fund, 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.

## FUNDING LIQUIDITY RISKS

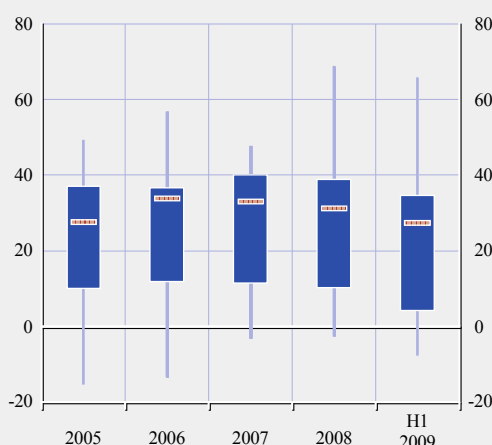
More than two years after the start of the financial sector turmoil, funding liquidity problems have remained an issue for LCBGs. While conditions improved substantially in most funding segments throughout 2009, some of these institutions, and parts of the broader euro area banking system, remain reliant on temporary support measures extended by central banks and governments.

An important indicator for gauging the wholesale funding needs of banks is the customer funding gap – i.e. the shortfall of deposits relative to customer loans. For a subset of 16 LCBGs, the median funding gap (expressed as a percentage of customer loans) dropped by around

<sup>29</sup> 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 4.23 Customer funding gap of large and complex banking groups in the euro area**

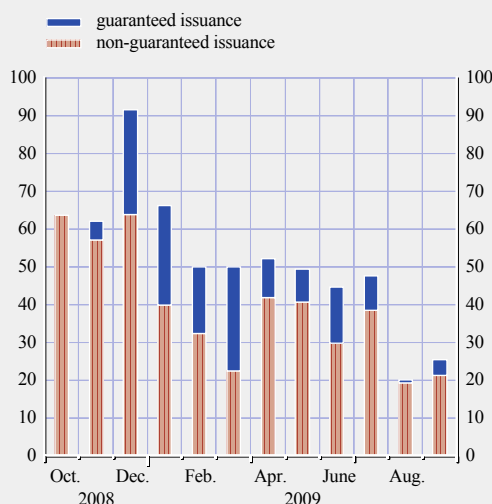
(2005 – H1 2009; percentage of customer loans; minimum, maximum, interquartile range and median)



Sources: Individual institutions financial reports and ECB calculations.  
Notes: The customer funding gap is defined as the difference between customer loans and customer deposits. The sample consists of 16 LCBGs.

**Chart 4.24 Guaranteed and non-guaranteed euro area LCBG bond issuance**

(Oct. 2008 – Sep. 2009; EUR billions)



Sources: Dealogic and ECB calculations.

4 percentage points in the first half of 2009 (see Chart 4.23). This overall narrowing of funding gaps reflected a combination of attracting more customer deposits and/or restraining credit growth. However, several LCBGs still maintain wide funding gaps, so that their reliance of wholesale funding markets remains high. This means that their ability to increase lending remains reliant on having access to smoothly functioning money and debt capital markets.

As regards short-term funding, the substantial narrowing of spreads between secured and unsecured money market rates at the shorter end of the maturity spectrum and the decline in allotment volumes in the Eurosystem's main refinancing operations indicate that the challenges euro area LCBGs have been facing in the wholesale money markets continued to ease (see also Section 3 above). However, market intelligence suggests that banks continue to face uncertainty regarding their future access to funding in the term money markets.

Government guarantee schemes supported the issuance of bank bonds in early 2009, but, as market conditions improved, the issuance of bonds without guarantees began to show signs of recovery (see Chart 4.24). The initiation of the Eurosystem's covered bond purchase programme contributed to a replacement of guaranteed bond issuance by issuance of covered bonds. At the same time, better bond issuance conditions for banks were reflected in a lowering of swap spreads, although these spreads still remained above pre-crisis levels. The fact that overall bond issuance did not return to pre-crisis levels appears to have been more a reflection of lower funding needs, against the background of a weak macro-financial environment, rather than a reflection of impaired access to funding markets. In this respect, the proportion of banks reporting in the context of the ECB's bank lending survey that they were confronted with hampered access to unsecured debt markets continued to fall in the last two quarters of 2009. Looking forward, continuing improvements in the access of LCBGs to debt

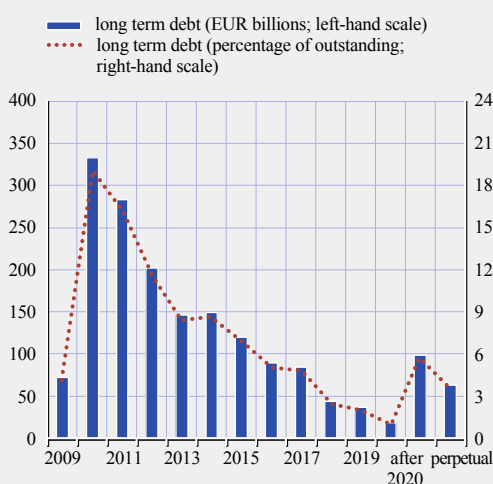
capital markets is a key prerequisite for lasting improvement in their funding conditions, and it should also help to alleviate pressures in the money markets.

Notwithstanding banks' recent efforts to extend the maturity profile of their debt – for instance, by issuing covered bonds or longer-dated unsecured debt – many euro area LCBGs will have to roll over a significant amount of debt over the next two years (see Chart 4.25). Based on the debt outstanding at the beginning of October 2009, on average, 35% of euro area LCBGs' long-term debt will mature in 2010 and 2011.<sup>30</sup>

A pertinent issue regarding euro area LCBG's access to financing is the dependence of some of these institutions on public sector support, including central bank liquidity schemes and bond guarantees, as well as capital support extended by governments. Box 11 provides an in-depth discussion of recent developments in government support for the euro area banking sector and highlights the risks related to the eventual exit from these measures.

**Chart 4.25 Long term debt of euro area large and complex banking groups, broken down by maturity date**

(as at 1 October 2009)



Sources: Dealogic, DCM Analytics and ECB calculations.

Note: Banks' long-term debt includes bonds, medium-term notes, covered bonds and other debt securities with a minimum maturity of 12 months.

30 Long-term debt includes bonds, medium-term notes, covered bonds and other debt securities with a minimum maturity of 12 months.

## Box 11

### PUBLIC MEASURES TO SUPPORT BANKING SYSTEMS IN THE EURO AREA

In response to the intensified financial market stresses in the autumn of 2008, euro area governments implemented coordinated support measures to alleviate strains on their banking systems. These measures complemented the extensive liquidity support that has simultaneously been provided by the ECB.<sup>1</sup> This box summarises the public measures that have been taken and discusses their implications for euro area governments' fiscal balances. It also reviews some issues related to the eventual exit from such measures.<sup>2</sup>

The announced government support measures fall into three distinct categories, namely (i) guarantees for bank liabilities, (ii) capital injections and (iii) asset support schemes. A summary of the measures that were put in place, and the extent of their use so far, is given in the table below. The figures without parenthesis show the volume of support that had been

1 In June 2009, the ECB also started to provide liquidity through longer-term refinancing operations (LTROs) with a maturity of one year. The operations have been conducted as fixed rate tender procedures with full allotment and have been in addition to the regular and supplementary LTROs. On 3 December 2009, the ECB announced that it would discontinue this programme, allotting its last 12-month LTRO on 16 December 2009. In addition, the ECB decided to stop its six-month LTROs in the first quarter of 2010, by carrying out the last operation on 31 March.

2 This box provides an update to Boxes 10 and 11 in the December 2008 and June 2009 issues respectively of the FSR.

### Summary of public support measures in Europe

(EUR billions unless stated otherwise)

|           | Capital injections |                    | Liability guarantees               |                               | Asset support     |                    | Total commitment<br>as % GDP |
|-----------|--------------------|--------------------|------------------------------------|-------------------------------|-------------------|--------------------|------------------------------|
|           | Within<br>schemes  | Outside<br>schemes | Guaranteed<br>issuance<br>of bonds | Other<br>guarantees,<br>loans | Within<br>schemes | Outside<br>schemes |                              |
| Europe    | 160.7 (244)        | 57.6               | 615.2 (2,135)                      | 233.1 (14)                    | 299.7 (279)       | 71.5               | 26.9                         |
| EU        | 160.7 (234)        | 57.6               | 615.2 (2,095)                      | 233.1 (14)                    | 258.5 (238)       | 71.5               | 27.5                         |
| Euro area | 72.8 (131)         | 55.1               | 414.2 (1,677)                      | 229 (-)                       | 40.7 (238)        | 71.5               | 27.1                         |

Sources: National authorities, Bloomberg and ECB calculations.

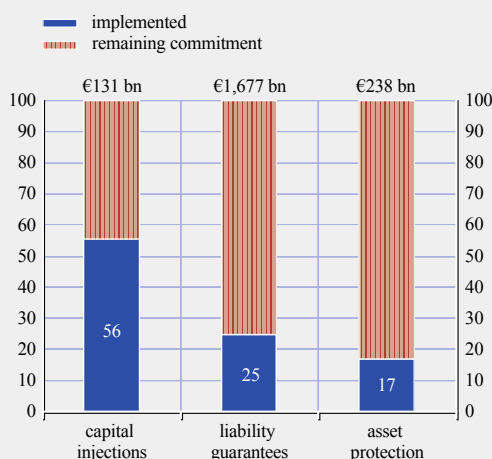
Notes: Data are cumulative since October 2008. The figures in brackets show total commitments for each measure. Some of the measures may not have been used, despite having been announced. Usage of guarantees includes issued bonds, but not guaranteed interbank loans. Capital injections outside schemes are support measures used without a scheme having been explicitly set up.

extended to banks by the cut-off date of this FSR, while the figures within parenthesis show the full amounts to which governments have committed in principle.

Regarding the implementation of the measures, some conclusions can be drawn. The take-up rate has generally been low across all measures, but there are substantial variations: the use of recapitalisation measures has been relatively widespread, while issuance of bank bonds with government guarantees has been considerably lower (see Chart A). It should be noted that there are significant differences between countries and that the volume and use of liability guarantees in absolute figures are far higher than the volume and use of capital injections. Furthermore, it seems that the largest part of the financial support has been targeted to a relatively small number of institutions (see Chart B). Indeed, according to publicly available data, about half of the support extended across each type of measure for the entire euro area has been absorbed by the three largest recipient institutions. For each individual support measure, the three largest recipients, which may differ depending on the measure concerned, represent between 7% and 9% in terms of total euro area banking assets.

**Chart A Take-up rates of public support measures (excluding outside schemes) in the euro area**

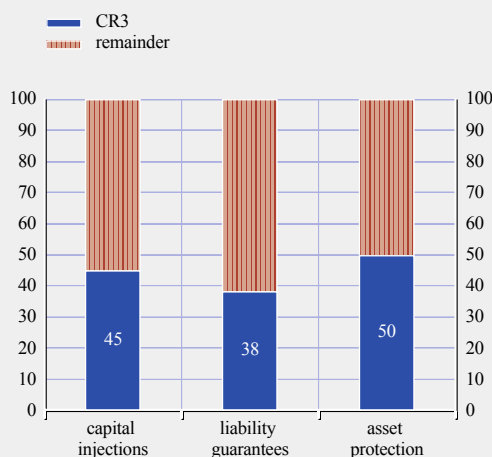
(Oct. 2008 – Nov. 2009; percentage of total and EUR billions)



Sources: National authorities, Bloomberg and ECB calculations.

**Chart B Concentration ratio of implemented public support measures in the euro area**

(Oct. 2008 – Nov. 2009; percentage of total)



Sources: National authorities, Bloomberg and ECB calculations.  
Note: The CR3 ratio shows the share of support that is dispensed to the largest three recipient institutions.

The various measures to support the financial sector amount to considerable actual and contingent liabilities for euro area governments. While the governments' budget deficits are not materially affected in the short run, the impact on government debt depends on the borrowing requirements necessary to finance the actual recapitalisation measures. It should be noted that this comes on top of the rapidly rising government deficits and debt due to the economic slowdown and discretionary stimulus measures. At the same time, government budgets are currently benefiting from the remuneration of guarantees and capital injections. The contingent liabilities associated with the support for the financial sector represent major risks for government deficits and/or debt in the medium term. In addition, fiscal risks in the form of rapid changes in market sentiment that lead to less favourable refinancing costs are sizeable for all euro area countries with very large fiscal imbalances.

Mainly on account of the recent improvement in the financial performance of large and complex banking groups, a debate has started on exit strategies from government support measures. However, the discussion of exit strategies from financial sector support should not be confused with their actual implementation. At the current juncture, strains on the financial sector have alleviated, but the sustainability of the improvement in the financial stability outlook may, in the case of some individual financial institutions, remain partly reliant on existing support measures. Until the recovery proves to be firmly established, especially as regards private sector investment and job creation, the risk of setbacks in the improvement of private sector earnings and income prospects remains significant.

All in all, the challenges facing the euro area banking sector in the period ahead call for caution so as to avoid timing errors in disengaging from public support. In particular, exit decisions by governments will need to carefully balance the risks of exiting too early against those of exiting too late. The continuing resilience of financial institutions in the absence of government support will be an important element in deciding upon the timing of exits, since exiting before the underlying strength of key financial institutions is well established entails the risk of leaving institutions vulnerable to adverse disturbances, possibly even triggering renewed financial system stresses. On the other hand, exiting late can give rise to the risk of distorting competition, creating moral hazard risks that come with downside protection – including the possibility of excessive risk-taking – as well as exacerbating risks for public finances. For some banks, especially those that have received state support, fundamental re-structuring will be needed in order to confirm their long-term viability when such support is no longer available. This may entail the shrinking of balance sheets through the shedding of unviable businesses with a view of enhancing their profit-generating capacities. Indeed, such re-structuring is already under way for some large banks in the euro area.

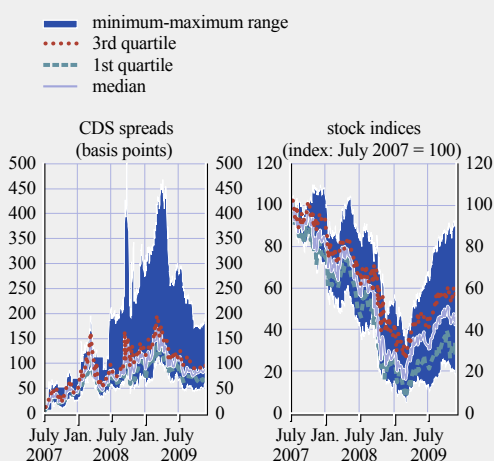
#### 4.3 OUTLOOK FOR THE BANKING SECTOR ON THE BASIS OF MARKET INDICATORS

After the finalisation of the June 2009 FSR, several market indicators based on prices of euro area LCBGs' securities continued to improve. In particular, the CDS spreads of these institutions narrowed further and the rebound in their stock prices was extended (see Chart 4.26). An important reason for these developments

appears to have been a lowering of systemic risk and an abatement of tail risk, thanks primarily to downside-protection by governments of financial institutions' balance sheets. That said, the volatility and correlation of asset returns has remained relatively high and default risk in the financial sector does not appear, in the eyes of market participants, to have fully dissipated (see Chart S106). In particular, while perceptions of systemic risk have waned, market

**Chart 4.26 Euro area large and complex banking groups' equity prices and five-year senior credit default swap spreads**

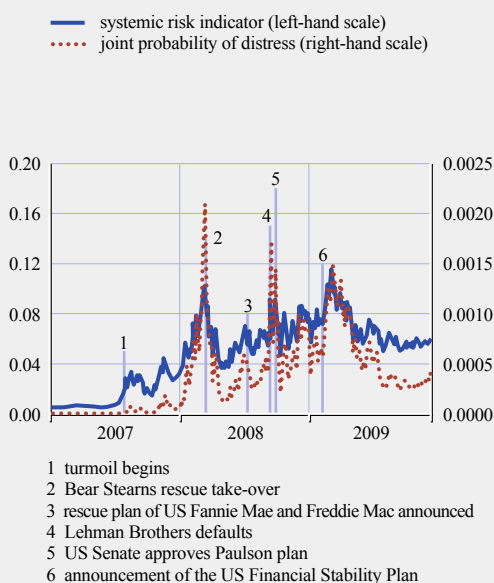
(July 2007 – Nov. 2009; spreads in basis points; senior debt; five-year maturity; stock price index: July 2007 = 100)



Source: Bloomberg.

**Chart 4.27 Systemic risk indicator and joint probability of distress of euro area large and complex banking groups**

(Jan. 2007 – Nov. 2009; probability)



Sources: Bloomberg and ECB calculations.

Notes: Both indicators are based on the information embedded in the spreads of five year CDS contracts for euro area LCBGs. However, assuming the term structure function for probabilities of default (PDs) implied from CDS spreads, it is possible to calculate the probability of systemic event over the shorter time horizon. For instance, systemic risk indicator presented in the chart provides an assessment of the probability of two or more LCBGs defaulting simultaneously over a horizon of two years. See the box entitled "A market-based indicator of the probability of adverse systemic events involving large and complex banking groups" in ECB, *Financial Stability Review*, December 2007, for a description of the systemic risk indicator, and the box entitled "Measuring the time-varying risk to banking sector stability" in ECB, *Financial Stability Review*, December 2008, for a description of the joint probability of distress indicators.

participants still appear to be concerned about the potential for idiosyncratic risks connected with the condition of individual financial institutions. This has manifested itself in a greater differentiation between the risk profiles of individual institutions, which has shown up in wide dispersions between, for instance, their CDS spreads.

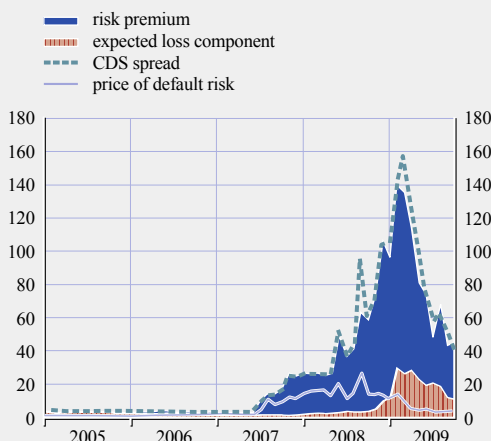
A systemic risk indicator, which measures the probability of at least two euro area LCBGs defaulting simultaneously over the following two years, and the joint probability of distress, which looks at the probability of a joint failure of all euro area LCBGs, provide forward-looking measures of market participants' perceptions

of the likelihood of systemic events. Both of these indicators fell markedly after May 2009, suggesting that systemic risk in the banking sector has abated considerably (see Chart 4.27). The decline in these systemic risk indicators mirrors not only the lower level of CDS spreads, but also the above-mentioned decline in the dispersion of individual LCBGs' CDS spreads, which indicates that default correlation within the euro area banking sector has decreased as well. That said, although both indicators of systemic risk have decreased, they still stood at relatively high levels at the time of writing.

Some light can be shed on the reasons for market perceptions of lower systemic risk in

**Chart 4.28 Decomposition of one-year senior credit default swap (CDS) spreads of euro area large and complex banking groups and the price of default risk**

(Jan. 2005 – Oct. 2009; basis points)



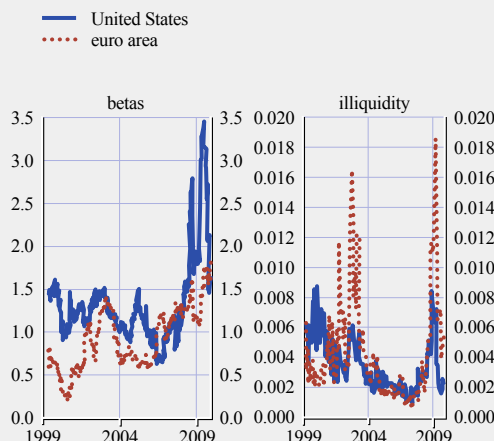
Sources: Bloomberg, Moody's KMV and ECB calculations.  
Note: Since expected-loss components and risk premia were calculated for each LCBG individually, their medians do not necessarily add up to the median CDS spread. See the box entitled "Price of default risk as a measure of aversion to credit risk" in ECB, *Financial Stability Review*, December 2008, for a description of how the price of default indicator was constructed.

the euro area banking sector by decomposing movements in the CDS spreads of euro area LCBGs (see Chart 4.28). While the expected-loss component, which represents the part of the CDS spread that is driven by pure default risk, fell slightly, it still remained at relatively high levels until end-October 2009. By contrast, the risk premium component and the price of default risk, i.e. the amount paid by protection buyers to protection sellers for bearing default risk, decreased substantially. Indeed, the price of default risk had, by October 2009, fallen close to the levels that had last been seen in the first months after the eruption of the financial turmoil in August 2007. All in all, these patterns would tend to support the view that CDS market participants consider the likelihood of a systemic spill over to have diminished considerably, but still expect that the outlook for each individual LCBG will remain challenging.

The recovery in bank stock prices, against a background of expectations for modestly improving earnings, has also brought about substantial improvements in traditional

**Chart 4.29 Beta coefficients and illiquidity risk of euro area and US banks**

(Jan. 1999 – Nov. 2009; beta coefficient and unit measure)



Sources: Thomson Reuters Datastream and ECB calculations.  
Notes: Beta coefficients are estimated from rolling 120-day regressions of  $R = \alpha + \beta R_m$ , where  $R$  denotes the banking sector return and  $R_m$  the world market return. Illiquidity is calculated as the monthly average ratio of the banking sector's daily absolute return to the trading volume (multiplied by  $10^6$ ) and measures the price impact of the order flow, as in Y. Amihud, "Illiquidity and stock returns: cross-section and time-series evidence", *Journal of Financial Markets*, Vol. 5, 2002, pp. 31-56.

price/earnings ratios based on the previous 12 months of earnings. However, when assessing recent stock price movements against ten-year trailing earnings, which smoothens the cyclicity of earnings, the recovery has been far more modest. By end-October 2009, this valuation measure of banks' stock prices remained at very low levels by historical standards (see Chart S113).

Uncertainties about future prospects for euro area and global banks have also been evident in beta coefficients, which capture systematic risk, as derived from the capital asset pricing model (CAPM).<sup>31</sup> While beta coefficients reached very high levels in the past six months (see Chart 4.29, left-hand panel), they started to fall in late 2009, especially for US banks. That said, they still remain high, which indicates that a common factor continues to drive bank stock price

<sup>31</sup> Systematic risk, also sometimes called market risk or undiversifiable risk, should be carefully distinguished from systemic risk. Systemic risk is the risk associated with overall aggregate market returns.

performances. Putting these findings together with those from the readings of the systemic risk indicator suggests that common exposures, namely the dependence of banks on the performance of the real economy, has been playing an important role in shaping expectations about future banking sector prospects. Notably, there are indications that the market liquidity – i.e. the ability of an investor to execute a transaction without moving the price very much – for bank stocks has improved significantly since late 2008 and early 2009, although more for US than for euro area bank stocks (see right-hand panel of Chart 4.29). This should ultimately lower the volatility of stock prices, and it also suggests that the information content in bank stock prices has improved.

Uncertainty about the outlook for euro area banks' earnings and solvency has been evident in the distribution of option-implied risk-neutral density bands (see Chart 4.30). Recently, this distribution has narrowed and the downward skew has declined. Although the smaller downward skew is indicative of lower tail risk, by late November 2009, option market participants were still assigning a higher probability to the likelihood of further substantial declines in banks' stock prices than to sizeable increases, at least when considering horizons of three months.

All in all, although some financial market indicators suggest that systemic risk in the euro area banking sector has decreased substantially, credit risk indicators remained elevated in late November 2009, which implied that, in the view of market participants, euro area banks may still face some credit losses. These could further deplete capital in some banks in the period ahead. Nevertheless, fresh capital injections by many euro area banks have kept

**Chart 4.30 Dow Jones EURO STOXX bank index and option-implied risk-neutral density bands**

(Jan. 2005 – Mar. 2010; index value; 10%, 30%, 50%, 70% and 90% confidence intervals)



Sources: Bloomberg and ECB calculations.

Note: The fan-charts cover the horizon of three months and are based on the option prices as of 11 May 2007, 8 Nov. 2007, 6 May 2008, 27 Nov. 2008, 28 May 2009 and 27 Nov. 2009.

capital ratios at comfortable levels. Thus, euro area banks' resilience to possible further shocks has been maintained, despite challenging market conditions. This, coupled with various government support schemes already in place, has substantially decreased the tail risk of bank failures, while banks' earnings are expected to recover only gradually.

Thanks in part to the government support measures extended to the euro area banking sector, the ratings of most euro area LCBGs remained stable between the AA and A+ rating levels over the past six months (see Chart S115). Looking ahead, credit rating outlooks for euro area LCBGs improved after the finalisation of the June 2009 FSR (see Chart S114). The number of positive outlooks was substantially higher than the number of negative outlooks in end-October 2009 (see Table S7).

## CREDIT DEFAULT SWAPS AND COUNTERPARTY RISKS FOR EU BANKS

The financial turmoil has highlighted the importance of counterparty risk management for banks. An issue of particular relevance in this context has been counterparty risk that may crystallise through the over-the-counter (OTC) derivatives markets, as shown by the acute difficulties experienced by market participants in the aftermath of the default or near default of Bear Stearns, Lehman Brothers and AIG. These cases have highlighted the typically opaque linkages within the OTC markets, which led to a situation in which some market participants may have become too big or interconnected to fail. In view of these developments, the ESCB's Banking Supervision Committee (BSC) carried out a study aimed at assessing the counterparty risk and the main related risks faced by European market participants that are active in, and exposed to, the credit default swap (CDS) market. The report was based on survey data

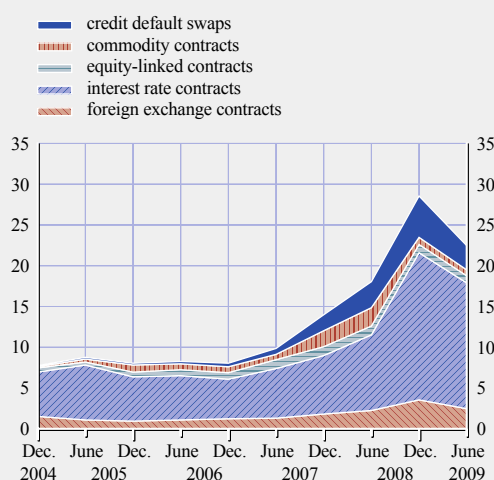
collected from a sample of 31 EU banks, as well as from a number of public and private data sources, and has benefited from market intelligence. This box summarises some of the main findings and policy measures outlined in the report.<sup>1</sup>

In terms of the gross market value, which is a measure of counterparty risks, the CDS market increased from USD 133 billion in December 2004 to USD 5.7 trillion in December 2008 and then decreased to USD 3 trillion in June 2009. It constitutes the second largest financial derivatives market after that for interest rate contracts. Increased volatility and the repricing of credit risk in the market have been the major drivers of the rapid increase in gross market values from mid-2007 to early 2009.<sup>2</sup> Amid the improving financial market conditions in the first half of 2009, CDS spreads tightened and volatility decreased, which led to a substantial decrease in gross market values for all OTC market contracts (see Chart A).

As an OTC market, the CDS market is dependent on dealers, which provide liquidity to the market by acting as market makers. That said, the concentration risk within the CDS market has increased since the outbreak of the financial market turmoil, in particular on account of the failure of Lehman Brothers and the exit of some major dealers or counterparties that used to be sellers of protection such as "monoline" financial guarantors, credit derivative product companies or hedge funds. Consequently, liquidity risk would also increase in the event of the failure of

Chart A Gross market values for OTC derivatives

(Dec. 2004 – June 2009; USD trillions)



Source: BIS.

1 ECB, *Credit default swaps and counterparty risk*, August 2009.

2 Gross market value is the value of all open contracts before counterparty or other netting. Once CDS spreads widened for many contracts, the current market CDS spread deviated substantially from the contractual CDS spread, agreed at the beginning of the contract. This led to increases in positive market values of contracts held by protection buyers and increases in the absolute value of negative market values of contracts held by protection sellers.

another dealer, which would probably result in higher bid-ask spreads and a reduced ability of market participants to perform transactions on the market.

Counterparty risk has uniformly been the main concern of EU banks in their feedback on the BSC survey. In terms of concentration, the top ten global counterparties of the largest EU banks surveyed in the CDS market account for between 62% and 72% of their CDS exposures.

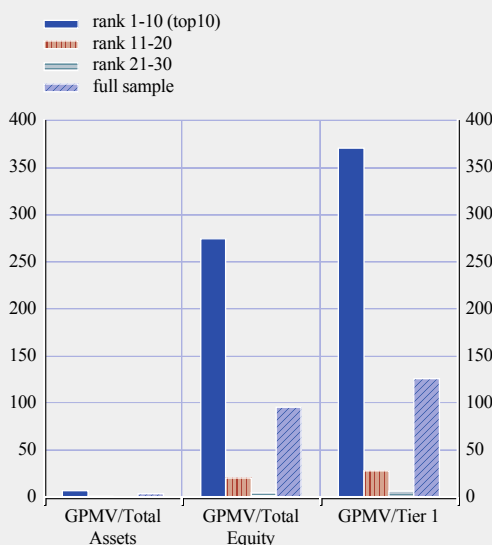
Furthermore, CDS counterparty exposures relative to bank capital are the highest for the largest EU banks surveyed. Gross positive market values accounted for more than 350% of their Tier 1 capital, compared with 125% for the average bank in the sample (see Chart B). The survey results also showed that only approximately 44% of the surveyed banks' exposures to OTC derivatives were collateralised as of December 2008.

Apart from increased market values, this relatively low level of collateralisation may have been caused by a lower participation of hedge fund counterparties – which tend to be regular users of collateral – and by exposures of banks to non-financial corporations and insurance companies, which are not collateralised. Furthermore, several European banks retain exposures to legacy CDS contracts from “monoline” financial guarantors and credit derivative product companies, which are not collateralised. All in all, given the current collateralisation levels of outstanding CDS contracts and outstanding exposures to non-collateralised legacy CDS contracts, the counterparty risks remain substantial.

The report also found that current data sources would benefit from further harmonisation and bridging to allow market participants and regulators to obtain and benefit from a broad and consistent market overview. The gross notional amounts of CDS contracts, such as those reported by the Bank for International Settlements (BIS) and the Depository Trust & Clearing Corporation (DTCC), are total notional amounts of all transactions that have not yet matured, prior to taking into account all offsetting transactions between pairs of counterparties. The net notional amount constitutes the basis for calculating net payment obligations in a credit event, with due consideration of all offsetting transactions between pairs of counterparties. The DTCC provides net notional data for single reference entities comprising the sum of net protection bought and sold across all counterparties. The BIS also produces the gross market values of CDS contracts, representing the value of all open contracts before counterparty or other netting. The marked-to-market value of a CDS on a given reporting date is the cost of replacing the transaction on that date. The gross market value is not an accurate measure of counterparty risk, however, since it does not take into account the effect of netting for each pair of counterparties. The net market value (also referred to as the gross credit exposure) is calculated by banks across all OTC derivative positions and would be a measure of counterparty risk, assuming that there

**Chart B Gross positive market values relative to assets and capital**

(percentages)



Source: Banking Supervision Committee.  
Note: GPMV = gross positive market value.

was no collateralisation. The counterparty exposure that remains after collateralisation, however, would be the genuine counterparty risk. Given the currently regularly disclosed or available data, however, the net CDS exposures of the euro area banks cannot be assessed separately.<sup>3</sup>

Regarding policy measures, public disclosure should be improved. Although institutions reporting under the International Financial Reporting Standards (IFRSs) report derivatives exposures on their balance sheets, the institutions with highest exposures to the CDS market could regularly disclose their total gross notional amounts and gross market values for bought and sold CDSs, as well as net market values for uncollateralised transactions in derivatives. This information could also be provided on individual institutions' largest counterparty positions, and could be disclosed in their financial statements. Also, improved price information for non-dealers, as well as an enhanced transparency of turnover volumes for trades, would be desirable for both non-dealer market participants and supervisors.

An important way to reduce counterparty risk in the CDS market is to establish a central counterparty, which may reduce the system-wide counterparty risks embedded in the transactions and increase market transparency. Few central counterparties have already been launched and some more are being developed. Given the role that will be played by such central counterparties, it will be crucial to ensure that the stand-alone central counterparties are robust and efficient, operating with appropriate risk management and with a capital and regulatory structure that will minimise risks to financial stability.

3 For US banks, the securities and Exchange Commission collects and publishes detailed information on their CDS positions.

#### 4.4 OVERALL ASSESSMENT

The financial results of the euro area large and complex banking groups improved in the second and the third quarters of 2009, after the dismal performance in the second half of 2008. Supporting the recovery in LCBGs' earnings was a significant pick-up in trading income, thanks to the buoyancy of capital markets, as well as an increase in net interest income, while income from fees and commissions remained relatively stable. At the same time, most LCBGs continued with their efforts to cut costs and to streamline and restructure their businesses. While many of these institutions also had to contend with an increase in loan-loss provisions, they were mostly able to absorb these losses and still disclose profits.

Looking forward, notwithstanding the recent improvement, the central scenario is for subdued banking sector profitability in the short to medium term, given the prospects for a broad-based loan book deterioration, as well

as market and supervisory authority pressure on banks to keep leverage under tight control. In view of this outlook, a key source of downside risk is the possibility that the favourable macro-financial environment supporting banks' earnings might deteriorate before the peak of banks' loan losses is reached. For the broader euro area banking system, concentrations of exposures on certain sectors, such as commercial property, or geographical areas, such as the central and eastern European region, constitute additional sources of risk.

While there has been an improvement in euro area banks' access to, and cost of, funding across virtually all sources of wholesale funding, with the exception of securitisation, fragilities remain. In this context, a particular issue is the timing and manner of exit from the public sector support measures that are currently in place, including central bank liquidity facilities and funding guarantees, as well as the capital support extended by euro area governments.

Finally, a setback in the nascent process of global economic recovery or in financial asset prices would have an additional adverse impact on banks' asset quality, raising the spectre of a further need for government support in a context where the sustainability of public finances is already being severely tested.

The EU-wide stress-test coordinated by the Committee of European Banking Supervisors (CEBS) has shown that the largest European banking groups would likely prove resilient to a very severe adverse scenario. The resilience reflected the recent increase in earnings forecasts and, to a large extent, the important support being provided by the public sector to banking institutions, notably through capital injections and asset guarantees, which has augmented their capital buffers. The continuing resilience of financial institutions in the absence of government support will be an important element in deciding upon the timing of exits, since exiting before the underlying strength of key financial institutions is sufficiently well established runs the risk of leaving institutions vulnerable to adverse disturbances, possibly even triggering renewed financial system stresses.

The most significant risks euro area LCBGs currently face include:

- ↑ the possibility that the recent recovery in earnings does not prove sustainable;
  - ➡ further increase in loan losses;
  - ➡ market risks associated with a fragile macro-financial environment; and
  - ↓ funding liquidity risks (in the presence of public sector support measures, for most LCBGs).
- ↑ *Increased risk since the June 2009 FSR*  
 ➡ *Unchanged since the June 2009 FSR*  
 ↓ *Decreased risk since the June 2009 FSR*

## 5 THE EURO AREA INSURANCE SECTOR

*The euro area insurance sector continues to be confronted with challenging conditions. Financial performances of insurers remained rather subdued, on average, in the second and third quarters of 2009, although results varied across institutions. However, some risks facing insurers – in particular investment risks – have decreased somewhat. Other risks, in particular those associated with low government bond yields and a weak economic environment, remain. This notwithstanding, available information on the solvency positions of euro area insurers suggests that they, on average, have a reasonable amount of remaining shock-absorption capacity to weather the materialisation of the risks they currently face.*

### 5.1 FINANCIAL CONDITION OF LARGE PRIMARY INSURERS AND REINSURERS

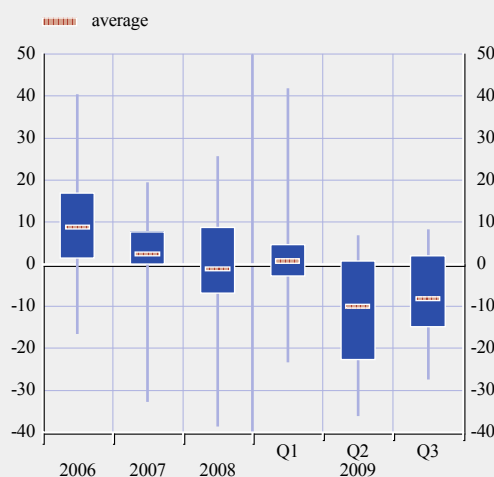
#### FINANCIAL PERFORMANCE OF LARGE PRIMARY INSURERS<sup>1</sup>

The challenges faced by euro area primary insurers in the first half of the year largely continued in the third quarter, although there were some signs of improvement. On average, premiums written declined in both the second and the third quarters of 2009, with some insurers reporting large decreases (see Chart 5.1). The continued uncertainty in equity and credit markets reduced demand for life insurance products, in particular unit-linked products – where the investment risk is borne by the policyholder – and contributed to lower premiums written. Some insurers (mainly life insurers) also saw higher lapse rates – where the policyholder fails to pay the premium – and surrender rates – where the policyholder cancels a policy. Non-life premium growth was for many insurers hampered by, in particular, the weak economic environment, which kept demand from households and firms muted.

Lower underwriting income and higher expenses pushed combined ratios close to 100% for some of the primary insurers considered

**Chart 5.1 Distribution of gross-premium-written growth for a sample of large euro area primary insurers**

(2006 – Q3 2009; percentage change per annum; maximum, minimum and interquartile distribution)



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

(a combined ratio of more than 100% indicates an underwriting loss for the insurer) (see Chart S119).

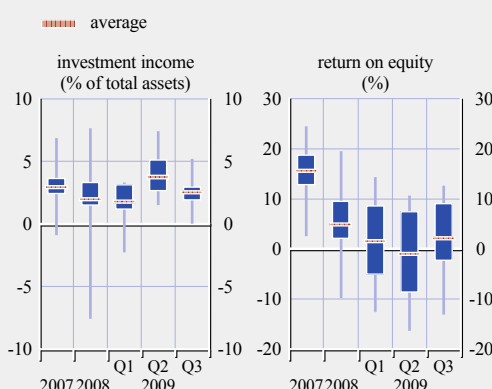
Investment income in the second and third quarters of 2009 benefited from the improvements in capital markets after mid-March 2009 (see Chart 5.2). The improvement was broad-based as the distribution across institutions shifted upwards in comparison with the first quarter of 2009 and all the primary insurers considered avoided investment losses during these two quarters.

The improvements in investment income were, however, not enough to avoid lacklustre profitability performances (see Chart 5.2). The average return on equity stood at around 2% in the third quarter of 2009, and some insurers continued to report net losses.

<sup>1</sup> The analysis of the financial performance and condition of large euro area primary insurers is based on the consolidated accounts of a sample of 20 listed insurers, with total combined assets of about €4.5 trillion. This represents around 60% of the gross premiums written in the euro area insurance sector. However, at the time of writing, not all figures were available for all companies.

**Chart 5.2 Distribution of investment income and return on equity for a sample of large euro area primary insurers**

(2007 – Q3 2009; maximum, minimum and interquartile distribution)



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

### FINANCIAL PERFORMANCE OF MAJOR REINSURERS<sup>2</sup>

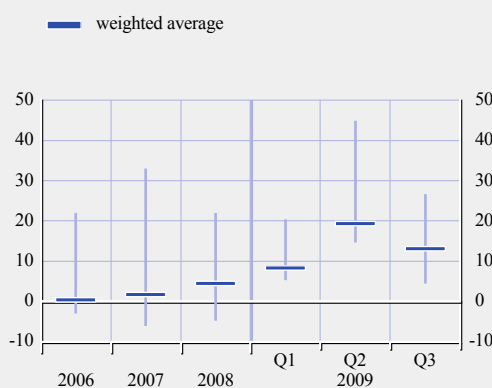
All of the euro area reinsurers considered reported increases in gross premiums written in the first three quarters of 2009 (see Chart 5.3). Reinsurers benefited from the financial challenges facing some primary insurers, as demand for reinsurance increased when primary insurers tried to improve their solvency positions. In addition, underwriting income was supported

by an increase of some 8% in reinsurance prices during the 2009 reinsurance renewals.<sup>3</sup> The price increases were mainly a result of the relatively costly 2008 hurricane season and the impact the financial crisis had on reinsurers' balance sheets. Some market participants had expected that reinsurers would drive reinsurance rates up even higher due to their weakened capital positions, but primary insurers appear to have been reluctant to accept higher rates as they focused on containing costs. Looking ahead, due to the improvement in reinsurers' capital positions thus far in 2009 and the expected contained demand for reinsurance from primary insurers, reinsurance professionals and market participants attending the annual Monte Carlo reinsurance gathering in September 2009 expected reinsurance rates to fall during the upcoming January 2010 renewals, unless a major catastrophic event occurs before then.<sup>4</sup>

- 2 The analysis of the financial performance and condition of major euro area reinsurers is based on the consolidated accounts (also including primary insurance activity, where applicable) of a sample of four reinsurers, with total combined assets of about €290 billion, representing about 30% of total global reinsurance premiums. However, not all figures were available for all companies.
- 3 See Guy Carpenter, *World Catastrophe Reinsurance Market 2009*, September 2009.
- 4 See JPMorgan Chase & Co., *Reinsurance: Monte Carlo update*, September 2009.

**Chart 5.3 Distribution of gross-premium-written growth for a sample of large euro area reinsurers**

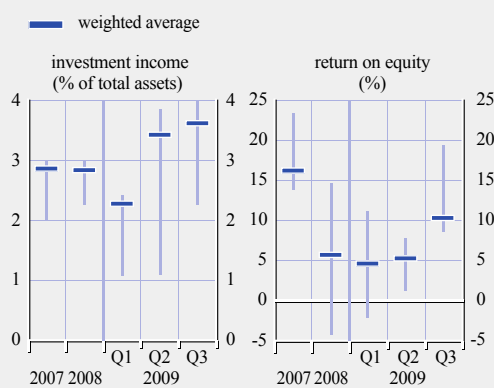
(2006 – Q3 2009; percentage change per annum; maximum-minimum distribution)



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

**Chart 5.4 Distribution of investment income and return on equity for a sample of large euro area reinsurers**

(2007 – Q3 2009; maximum-minimum distribution)



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

Reinsurers' investment income improved throughout the first three quarters of 2009, which supported overall profitability (see Chart 5.4). Return on equity increased to around 10%, on average, in the third quarter of 2009, from 5.4% in the second quarter (see Chart 5.4).

#### SOLVENCY POSITIONS OF LARGE PRIMARY INSURERS AND REINSURERS

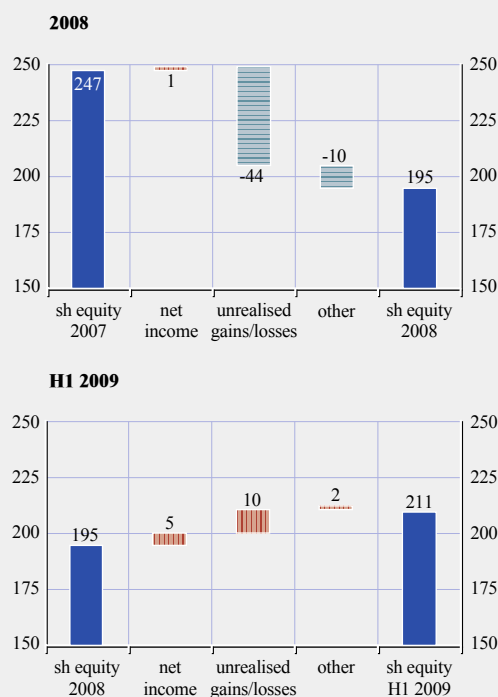
Primary insurers' and reinsurers' capital positions deteriorated during 2008 as value losses of financial assets led to large unrealised losses, which in turn caused reductions in shareholders' equity (see Chart 5.5). This is due to the fact that insurers reporting in line with the International Financial Reporting Standards (IFRSs) mainly classify their investments as "available for sale", so that they are recorded at fair value on their balance sheets. Any value changes that are recorded lead to movements in shareholders' equity due to the recording of unrealised losses. However, some of these previously recorded unrealised losses were reversed in the first half of 2009, thanks mainly to the recovery in financial markets after mid-March (see Charts 5.5). This led to an increase of some 8% in shareholders' equity for the insurers under review in the first half of 2009 and to a further increase of 13% in the third quarter of 2009 for a sub-set of the insurers that report quarterly information.

Some insurers also took advantage of the improvements in capital markets in the second and third quarters of 2009, and issued senior debt to boost their capital positions (e.g. Aegon and Axa issued €1 billion of senior debt in the second quarter of 2009, and Allianz issued €1.5 billion in the third quarter).

In addition, many insurers continued to hedge equity and credit exposures to conserve capital, while some carried out significant outright sales of equities (see also Section 5.2). Some insurers also tried to preserve their capital positions by reducing dividends, with some cutting them to zero.

**Chart 5.5 Movement in shareholders' equity for a sample of large euro area primary insurers and reinsurers**

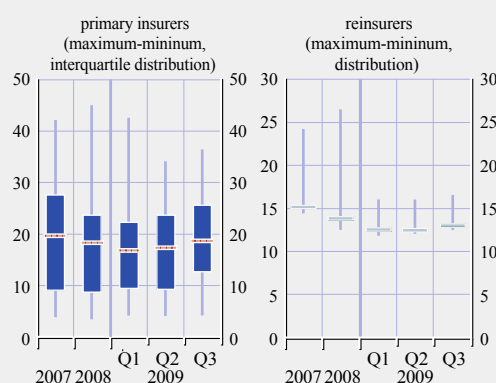
(EUR billions)



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

**Chart 5.6 Distribution of capital positions for a sample of large euro area primary insurers and reinsurers**

(2007 – Q3 2009; percentage of total assets)



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

Note: Capital is the sum total of borrowings, preferred equity, minority interests, policyholders' equity and total common equity.

All in all, capital positions in the third quarter of 2009 appeared, on average, to include a reasonable amount of shock-absorption capacity (see Chart 5.6). This was in part due to insurers often keeping their capital levels in excess of regulatory requirements, with the objective of obtaining a targeted credit rating from rating agencies. It should be noted, however, that it is difficult to measure capital adequacy consistently across insurance companies, in view of different national and company-specific practices and levels of disclosure.

## 5.2 RISKS CONFRONTING THE INSURANCE SECTOR

The most significant risks that euro area insurers currently face include, in no particular order:

- the possibility that government bond yields remain at low levels;
- credit investment risks;
- risks associated with a weak macro-financial environment;
- the risk of losses from catastrophic events exceeding projected losses; and
- contagion risks from banking activities or via links to banks and other financial institutions.

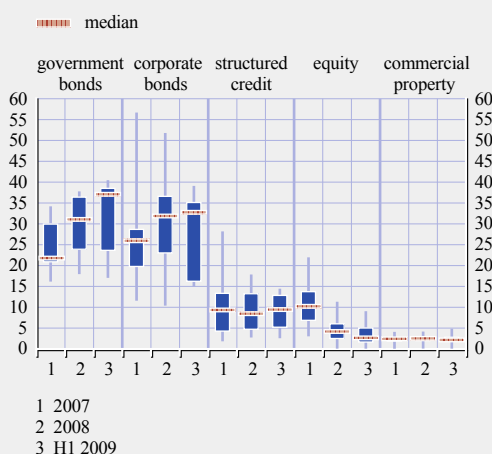
These risks are discussed below. It should be noted that these risks are not necessarily the most likely future scenarios that could negatively affect insurers, but are rather potential and plausible events that could, if they were to occur, materially impair the solvency of insurers.

### FINANCIAL MARKET/INVESTMENT RISKS

Financial market and other investment risks continue to be one of the most prominent risks that insurers are confronted with. However, due to the improved conditions in financial markets after the finalisation of the June 2009 FSR, the

**Chart 5.7 Distribution of bond, structured credit, equity and commercial property investment for a sample of large euro area insurers**

(2007 – H1 2009; percentage of total investments; maximum, minimum and interquartile distribution)



Sources: Individual institutions' financial reports and ECB calculations.  
Note: The equity exposure data exclude investment in unit trusts.

related risks for insurers have, to some extent, been reduced. Nevertheless, uncertainty about future developments in the markets in which insurers invest remains high.

Large euro area insurers continued to increase their investment exposure to government and corporate bonds during the first half of 2009, as they continued to shift their investment strategies away from equities in an attempt to de-risk their investment exposures (see Chart 5.7). These shifts in exposures reflect valuation changes of the securities held, but also outright portfolio shifts away from equities to corporate and government bonds. At the end of the first half of 2009, a sample of large euro area insurers had about 70% of their investments in bonds, up from about 50% at the end of 2007. In the past, investment in corporate bonds was somewhat higher than in government bonds, but in the first half of 2009 government bond exposures overtook corporate bond exposures and accounted for around 37% of total investment, compared with 33% for corporate bonds.

### The risk that government bond yields remain at low levels

Because of the large and increasing government bond exposures, insurers continue to face the risk of government bond yields remaining at low levels. Low government bond yields have a negative effect on the value of insurers' liabilities because government bond yields are used to discount future liabilities.<sup>5</sup> Lower yields will therefore lead to increases in the net present value of liabilities. This is a particular concern for life insurers that have a large stock of guaranteed-return contracts.

At the same time, low government bond yields also make it more difficult for insurers to generate investment income. This might lead to a situation in which they take on more investment risk in a search for higher-yielding assets to close the gap between the guaranteed interest rates and the risk-free rate used to discount liabilities.

Government bond yields in the euro area are currently around 40 basis points lower than they were in May 2009, which, together with the increased exposures to government bonds, has increased the associated risk for insurers (see Chart 5.7 and Box 13).

### Credit investment risks

Insurers' reported significant unrealised gains on their corporate bond holdings in the first nine months of 2009, due to the narrowing of corporate bond spreads (see Section 5.1). Looking ahead, although corporate bond exposures have increased, the improvements in the markets after the finalisation of the June 2009 FSR imply that the investment risks for insurers have declined somewhat (see Box 13). Nevertheless, spreads remain wide by historical standards and default rates on corporate bonds have risen sharply in recent months, and rates in Europe have not yet reached their expected peaks (see Section 2.2).

In addition, some euro area insurers remain exposed to the risk of continued lacklustre developments in structured credit markets. Structured credit product exposures remain

significant for some insurers, although most of the exposures comprise high-rated products (see Chart 5.7).

### Other investment risks

As already mentioned, most insurers continued to shift their investment strategies away from equities during the first half of 2009. As a result, insurers' equity exposures, excluding exposures to unit trusts, decreased from about 4%, on average, at the end of 2008 to below 3% in the middle of 2009 (see Chart 5.7). This has left insurers less vulnerable to adverse developments in stock markets. But it should also be noted that many insurers sold equity investments at low prices in 2008 and the early months of 2009 and, therefore, did not benefit from the increases in equity prices seen after mid-March 2009.

Some insurers have significant exposures to commercial property markets, via direct investment in property (see Chart 5.7) or investment in property funds or commercial mortgage-backed securities. Conditions in many commercial property markets in the euro area have continued to deteriorate over the past six months and the outlook remains uncertain (see Section 2.3). This could, in turn, negatively affect insurers' commercial property investments.

Looking ahead, the proposed changes by the International Accounting Standards Board (IASB) to financial instrument reporting are likely to have an impact on insurers' investment behaviour.<sup>6</sup> The IASB has proposed abolishing the "available for sale" category for financial instruments. This would have a major impact on insurers, since they currently classify most of their financial assets in this category. The change is likely to lead to increases in insurers' reported

5 It should be noted, however, that falling government bond yields also have a positive impact on insurers' financial results in the short term since they lead to unrealised gains on bond portfolios and an increase in shareholders' equity.

6 See International Accounting Standards Board, "Financial Instruments: Classification and Measurement", July 2009, and JPMorgan Chase & Co., "European insurance: IAS 39 accounting changes could have profound impact on reported numbers", July 2009.

book values of debt securities (as well as to corresponding increases in shareholders' equity), since most of them would be moved to the amortised cost category. This would reverse previously reported unrealised losses in shareholders' equity. It should be noted, however, that this accounting change would not impact solvency ratios in most jurisdictions, as solvency capital carries bonds at cost rather than at market value.

A further impact of the proposed change by the IASB is likely to be that equity holdings would, in principle, be marked to market

through the profit and loss account. This could create more volatility in insurers' earnings. As for the remaining equity instruments (so-called "strategic investments"), changes in their fair value, as well as realised gains and losses, would be reported under equity (rather than as a profit or loss), which is likely to reduce insurers' earnings. To avoid this, some market participants believe that the moves by many insurers away from equities in their investments in recent quarters were partly driven by the proposed change and that insurers might be less inclined to invest in equities in the future.

### Box 13

#### ASSESSING INSURERS' INVESTMENT RISKS

Investment risks are usually one of the most important types of risk an insurance company is confronted with. To mitigate investment risks, insurers often invest in various markets to spread their exposures. It is, therefore, important to analyse the conditions in the markets in which insurers invest and to combine this information with that on insurers' investment exposures to assess insurers' investment risks. This box proposes some measures of investment uncertainty, from an insurer's perspective, for the key markets in which insurers invest. It combines these measures with investment exposure data for a sample of large euro area insurers to assess their overall level of investment risk.

Large euro area insurers are most exposed to government and corporate bonds, equities, structured credit products and commercial property (see Chart 5.7). To assess the level of uncertainty and likelihood of investment losses in these markets from an insurer's perspective, some composite indicators for the different markets can be constructed. The indicators need to include measures of volatility to capture the uncertainty in the markets. In addition, the levels of prices and yields are also important for insurers as, for example, a prolonged period of low equity prices or low bond yields increases the likelihood that insurers will have to report investment losses on their investment. It also reduces the possibilities for insurers to generate investment income.

Chart A depicts some indicators constructed to capture the level of uncertainty for the main markets in which insurers invest. The chart shows the level of each indicator on the dates specified compared with its "worst" level (highest or lowest level depending on what is worse from an insurer's investment perspective) since January 1999. The computation of the composite indicators was based on the simple average of its scaled components. An indicator value of one therefore means that conditions in that market are the worst since January 1999.

It should be noted that these are rudimentary indicators, and comparisons of levels across indicators should be made with care, in particular as they do not take into account the risk characteristics across the different markets. For example, government bonds are arguably a safer investment

than equities, but this is not accounted for in the indicators. Nevertheless, the indicators are useful to monitor developments and the level of uncertainty in the different markets.

The indicators are computed as follows:

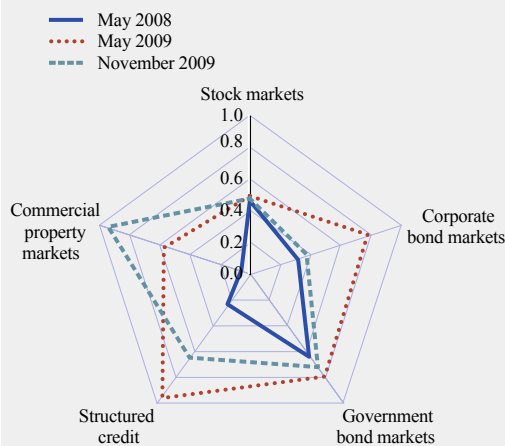
- “Stock markets” is the average of the index level and the price/earnings ratio of the Dow Jones EURO STOXX 50 index;
- “Corporate bond markets” is the average of euro area A-rated corporations’ bond spreads and the actual and forecast European speculative-grade corporations’ default rates;
- “Government bond markets” is the euro area ten-year government bond yield and the option-implied volatility for ten-year government bond yields in Germany;
- “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 level of year-on-year changes in euro area commercial property prices and rents.

The levels of uncertainty in the markets in which insurers invest have shifted markedly during the current financial crisis (see Chart A). At present, the likelihood of investment losses for insurers is lower than it was at the time of finalisation of the June 2009 FSR (in May 2009) for all markets except commercial property, where historically high declines in property values and rents in the euro area have recently increased the associated investment risk for insurers (see Chart A).

Analysing the conditions in different markets is, however, not enough to form an assessment of the total level of investment risks confronting insurers, as the levels of, and changes in, insurers’ investment exposures also have to be considered. To account for this, Chart B shows the indicator values depicted in Chart A but weighted by the investment exposure for a sample of large euro area insurers (as shown in Chart 5.7).

**Chart A Investment uncertainty map for euro area insurers**

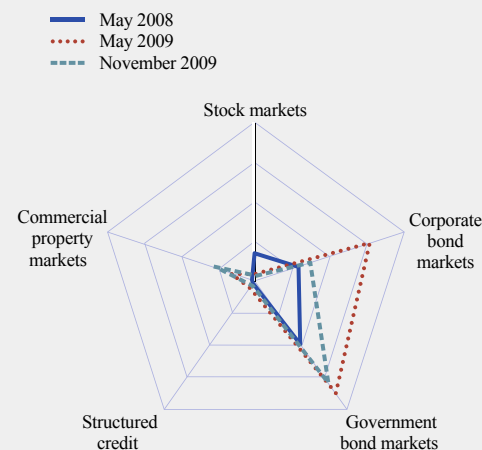
(the level of uncertainty increases with the distance from the centre of the map)



Sources: ECB, Bloomberg, JPMorgan Chase & Co., Moody’s, Jones Lang LaSalle and ECB calculations.

**Chart B Investment uncertainty map for euro area insurers weighted by investment exposures**

(the level of uncertainty increases with the distance from the centre of the map)



Sources: Bloomberg, JPMorgan Chase & Co., Moody’s, Jones Lang LaSalle, individual institutions’ financial reports and ECB calculations.

The high and recently increasing investment exposure to government and corporate bonds, together with the still rather high uncertainty prevailing in these markets, indicates that losses on bond holdings are one of the key investment risks that insurers are currently confronted with (see Chart B). Furthermore, although the uncertainty in equity markets remains comparable with that at the time of finalisation of the June 2008 and June 2009 FSRs (see Chart A), insurers' portfolio reallocations away from equities during the financial crisis have led to a decrease in the equity investment risk for insurers (see Chart B). Finally, insurers continue to be exposed to the weak conditions in commercial property and structured credit markets, but thanks to the, in general, rather low levels of exposures to these markets, the risks for insurers from such investments appear to be manageable, although it should be noted that exposures vary significantly across institutions.

#### RISKS ASSOCIATED WITH A WEAK MACRO-FINANCIAL ENVIRONMENT

Euro area insurers continue to face challenges due to the weak macro-financial environment. Although there have been signs of improvement in the macro-financial environment in the euro area since the finalisation of the last FSR, uncertainty about the outlook remains high (see Section 2.1).

There are four main ways in which this could continue to affect insurers negatively. First, insurance underwriting and profitability are likely to remain subdued in many segments until

the economy, and thereby demand for insurance products, has recovered (see Chart 5.8).<sup>7</sup>

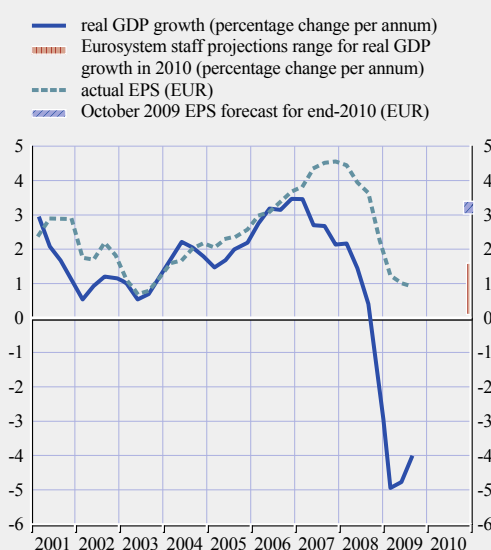
Second, in addition to reduced new premiums written, the deteriorating macroeconomic environment is reducing the disposable income of many households. This can lead to higher lapse and surrender rates, in particular for life insurers, as lower disposable income for households can reduce their ability to service premiums and may induce policy surrenders.

Third, insurers currently face high credit risks, as the situation in the corporate sector remains fragile owing to the weak economic conditions. This could result in losses on insurers' investments in corporate bonds and loans, structured credit products and different types of commercial property investment (see the sub-section above). In addition, some (mainly life) insurers also extend loans to households and firms, and would, therefore, be exposed to greater credit risks if credit market conditions in these sectors were to deteriorate further.

Fourth, fraudulent claims are more common during a recession. In the past, there has been a delay between the onset of a recession and the pick-up in fraudulent claims, as firms and households first try to cope with the tougher times before trying to extract money from an insurance policy. An increase in fraudulent claims in the period ahead cannot, therefore, be excluded.

**Chart 5.8 Earnings per share (EPS) and the forecast 12 months ahead for a sample of large euro area insurers, and euro area real GDP growth**

(Q1 2001 – Q4 2010)



Sources: ECB, Thomson Reuters Datastream and ECB calculations.

<sup>7</sup> See Box 13 in ECB, *Financial Stability Review*, December 2008, for an analysis of the insurance underwriting cycle in the euro area.

**Table 5.1 Atlantic hurricanes and storms recorded in 2008 and forecasts for 2009**

|                  | Historical average | 2008 | 2009 by end-Nov. | 2009 forecasts |      |
|------------------|--------------------|------|------------------|----------------|------|
|                  |                    |      |                  | CSU            | NOAA |
| Named storms     | 11                 | 16   | 9                | 10             | 7-11 |
| Hurricanes       | 6                  | 8    | 3                | 4              | 3-6  |
| Major hurricanes | 3                  | 5    | 2                | 2              | 1-2  |

Sources: Colorado State University (CSU) and National Oceanic and Atmospheric Administration (NOAA).

### THE RISK OF LOSSES FROM A CATASTROPHIC EVENT EXCEEDING PROJECTED LOSSES

For reinsurers and non-life insurers, one of the most prominent risks they face remains the potential for losses from catastrophic events to be larger than projected. However, the level of activity for the 2009 Atlantic hurricane season was somewhat lower than the historical average. Some losses might still have to be borne by insurers and reinsurers, but the fact that actual hurricane activity turned out to be in line with the forecasts made earlier during the year should have helped insurers to set aside adequate reserves (see Table 5.1).

That said, losses caused by European windstorms – which rank second in importance as a cause of global natural catastrophe insurance losses behind Atlantic hurricanes – are likely in the coming months and could be a challenge for some euro area insurers and reinsurers.

### CONTAGION RISKS FROM BANKING ACTIVITIES OR VIA LINKS TO BANKS AND OTHER FINANCIAL INSTITUTIONS

As highlighted in previous issues of the FSR, insurers engaged in banking activities or insurers that are part of a financial conglomerate have in many cases been more severely affected by the financial crisis, due to the especially testing environment in which banks have been operating.

In addition, many insurers have significant investment exposures to banks through equity, debt and debt securities holdings (including banks' hybrid capital and subordinated debt),

and therefore remain vulnerable to possible adverse developments in the banking sector. Some provisional estimates based on internal ECB data show that euro area insurance companies and pension funds held about €435 billion of debt securities issued by euro area MFIs in the second quarter of 2009. This represents 10% of total debt securities issued by euro area MFIs. At the same time, euro area insurers and pension funds held about €37 billion of quoted shares issued by euro area MFIs, which represents 8% of the total outstanding amount of MFI shares.<sup>8</sup>

As the outlook for the euro area banking sector has improved over the past six months, however, the risks for insurers have fallen somewhat.

### 5.3 OUTLOOK FOR THE INSURANCE SECTOR ON THE BASIS OF MARKET INDICATORS

Market indicators for insurers signal a less uncertain outlook than they did six months ago. Euro area insurers' credit default swap (CDS) spreads narrowed after the finalisation of the June 2009 FSR, and were in late November once again at levels similar to euro area banks and the overall iTraxx index (see Chart 5.9). Despite this improvement, insurers' CDS spreads still remained very wide compared with pre-crisis levels.

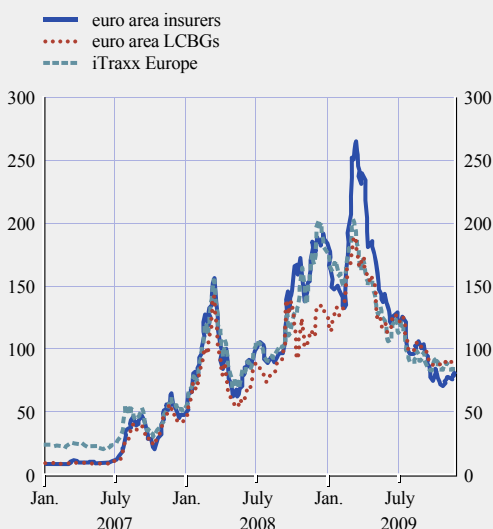
The stock prices of insurance companies recovered significantly after mid-March, although they remained well below the pre-crisis levels. They increased by some 87% from mid-March until late November, compared with 55% for the overall stock market (see Chart S128). The increase after the finalisation of the June 2009 FSR was 14%, the same as that for the overall stock market.

Although share prices of euro area insurers have risen in recent months, uncertainty about the future prospects for the insurance sector seems to remain, as the implied volatility of the Dow Jones EURO STOXX insurance

<sup>8</sup> See also the special feature entitled "The importance of insurance companies for financial stability" in this FSR.

**Chart 5.9 Average credit default swap spread for a sample of euro area insurers and large and complex banking groups, and the iTraxx Europe main index**

(Jan. 2007 – Nov. 2009; basis points; five-day moving average; five-year maturity; senior debt)



Sources: Bloomberg and JPMorgan Chase & Co.

index remained above its historical average (see Chart S129).

Many euro area insurers saw their financial strength ratings downgraded by rating agencies during the financial crisis. Rating agencies have maintained their negative outlook for the European primary insurance sector and for most large primary euro area insurers covered in this section. Only a few insurers, however, suffered rating downgrades after the finalisation of the June 2009 FSR. The outlook for euro area reinsurers is judged by rating agencies to be better, mainly thanks to the improvements in capital markets that have enhanced the possibilities for reinsurers to raise capital. In addition, reinsurers avoided large-scale losses thanks to the relatively mild Atlantic hurricane season. Because of this, some agencies have changed their outlook for the reinsurance sector from negative to stable in recent months.<sup>9</sup>

All in all, patterns in market indicators over the past six months imply a more stable and less uncertain outlook for the euro area insurance

sector, although many indicators have a long way to go before returning to pre-crisis levels.

#### 5.4 OVERALL ASSESSMENT

The financial performance of primary insurers and reinsurers remained subdued in the first nine months of 2009. Many of the pre-existing risks and challenges for the sector remain, and have been contributing to a persistently uncertain outlook. In particular, weak economic activity has continued to weigh on the underwriting performances of euro area insurers. At the same time, the uncertainty prevailing in financial markets and the low levels of government bond yields continue to pose challenges for the stability of insurers' investment income.

The most significant risks euro area insurers currently face include:

- ↑ the possibility that government bond yields remain at low levels;
  - ↓ credit investment risks;
  - ➡ risks associated with a weak macro-financial environment;
  - ↓ contagion risks from banking activities or via links to banks and other financial institutions; and
  - ➡ risk of losses from catastrophic events exceeding projected losses.
- ↑ Increased risk since the June 2009 FSR  
 ➡ Unchanged since the June 2009 FSR  
 ↓ Decreased risk since the June 2009 FSR

It is important to bear in mind that disclosed solvency positions of euro area insurers indicate a reasonable amount of remaining shock-absorption capacity to weather the materialisation of the risks they currently face.

<sup>9</sup> See, Fitch Ratings, "Reinsurers outlook revised to stable", November 2009.

## 6 STRENGTHENING FINANCIAL SYSTEM INFRASTRUCTURES

*Owing to the alleviated tensions observed in financial markets over the past six months, market infrastructures have operated in a generally more favourable economic environment. The operational performance and provision of services of the two most important payment infrastructures for the euro, namely TARGET2 and CLS, continued to be stable and robust in the reporting period, as illustrated by the key performance indicators. It is also noteworthy that no disruptions affected the resilient functioning of SWIFT, the architecture of which was further optimised. The issuance of the recommendations jointly developed by the European System of Central Banks (ESCB) and the Committee of European Securities Regulators (CESR) in June 2009 marked a milestone in the progress towards promoting euro area-wide consistency among the oversight policies and the activities of securities regulators conducted with regard to securities clearing and settlement systems at the national level. While the ESCB-CESR recommendations already addressed the specific risks related to the clearing of over-the-counter (OTC) derivatives, the industry initiatives fostered by regulators resulted in the setting-up of two EU central counterparties (CCPs) for the clearing of credit default swaps (CDSs) in July 2009.*

The resilient functioning of market infrastructures plays a crucial role in sustaining financial stability. As integral components of the financial system, market infrastructures act as intermediaries between the financial markets and institutions. The Eurosystem's involvement in market infrastructure oversight reflects the task assigned to it in Article 105(2) of the Treaty establishing the European Community with respect to promoting the "smooth operation of payment systems". Ensuring that systems processing the euro are safe and efficient is an important precondition for the Eurosystem's ability to contribute to financial stability, to implement monetary policy and to maintain public confidence in the currency.

The next section assesses, from an oversight perspective, the performance of key euro payment infrastructures and associated services in the period following the finalisation of the June 2009 FSR, and gives an update on initiatives aimed at strengthening the soundness and safety of the euro post-trading infrastructure.

### 6.1 PAYMENT INFRASTRUCTURES AND INFRASTRUCTURE SERVICES

#### DEVELOPMENTS IN KEY EURO PAYMENT INFRASTRUCTURES

##### TARGET2

Although the implementation phase of TARGET2 has been completed and the system is now fully operational, the system is continuously being developed further in order to remain responsive to the changing needs and requirements of the participants. The system is actually in constant evolution so as also to meet new challenges posed by market innovations and developments in information technology. The detailed and formalised change and release management framework employed for TARGET2 is aimed at promoting the well-prepared implementation of new system releases, thereby also facilitating the involvement of all relevant stakeholders in the release management process. The launch of a new TARGET2 release is the final result of a complex process, which, as a rule, embraces a preparation period of over 21 months. The process starts with consultations of the user community on the various requests for changes proposed for the next release. Following the careful assessment and prioritisation of the requests, the content of the system amendments is finalised and approved one year before the new release is launched in order to allow a proper planning and budgeting of all changes. The implementation of the changes includes programming, updating of the relevant system documentation and comprehensive testing. In general, the introduction of the new TARGET2 releases is scheduled for November each year, a timing which is harmonised with the annual standard SWIFT releases. From an oversight perspective, it is particularly important in this

context that the system services continuously meet the business needs and requirements of the users (Core Principle VIII on efficiency). The TARGET2 oversight function is of the opinion that this requirement is met by the change and release management framework of TARGET2. Moreover, the implementation of the few remaining elements of the framework is well on track (see also the sub-section on oversight assessments).

### Operational performance

Following the high transaction values processed in TARGET2 in the last quarter of 2008, presumably attributable to the challenging financial market conditions in the aftermath of the Lehman Brothers failure in September 2008, the first six months of 2009 showed a gradual return of the system to the pre-Lehman turnover level. The average daily value of settled transactions amounted to €2.25 trillion, while the daily average volume of transactions was 343,653. Notwithstanding the very limited impact of the financial market turmoil on the overall settlement activity of TARGET2, the analysis of some relevant indicators exhibited interesting patterns in this respect. From mid-2008 to mid-2009, for instance, the hourly average values settled on the Single Shared Platform (SSP) during a day had been increasing markedly in the last hour of operations (see Chart S133). The unusually high transaction values observed in the last quarter of 2008 can be attributed to the average liquidity surplus on participants' accounts at the end of the day. Furthermore, the relatively high figures recorded in 2008 may also be explained by the shorter maturity of interbank loans observed in the money market in that period. The data for the first two quarters of 2009, however, are closer to those observed before the financial market turmoil intensified in the last months of 2008. Nevertheless, in addition to the improved market conditions, the significant drop in transaction volumes in the first half of 2009, as compared with the first half of 2008, was also partly due to some technical reasons: at the beginning of 2009, the Eurosystem applied a new methodology

for calculating the various statistical indicators for TARGET2, which significantly affects the way turnovers are computed. In particular, in the last hour of operations some transactions that were included in the calculation of transaction volumes in 2008 are now excluded, e.g. transfers of funds to overnight deposit accounts or the repatriation of liquidity to local accounting systems.

In addition, the assessment of developments in the value and volume of non-settled payments (i.e. payments for which settlement was rejected by the SSP) might also be relevant in this respect (see Chart S132).<sup>1</sup> The overall level of non-settled payments in the first half of 2009 was lower than in the second half of 2008. The daily average number of non-settled transactions decreased from 600 to around 540, whereas the daily average value of these payments declined from €33 billion to €28 billion, which means that, in terms of value, a mere 1% of the total daily average turnover was not settled.

### Incidents

The TARGET2 oversight function devotes particular attention to the regular monitoring and assessment of incidents that occur, focusing – primarily but not exclusively – on significant disruptions classified as major incidents.<sup>2</sup> This is because these events may point out potential risks and vulnerabilities inherent in the system which, ultimately, might have implications for its compliance with Core Principle VII on security and operational reliability. The analysis of all incidents in TARGET2 between April and September 2009 did not identify any significant risks in this respect. Aside from the fact that no major incident affected the continuous functioning of TARGET2, there was also a decrease in the number of minor technical problems. Since none of these events resulted in

1 It should be noted that the data should be evaluated with care owing to the fact that the reason for non-settlement cannot be identified.

2 Major incidents are those lasting more than two hours and/or leading to a delayed closing of the system.

complete downtime, the calculated availability ratio of TARGET2 remained at 100% over the reporting period (see Chart S134). The overseers concluded that all failures had been properly followed up by the operator, and that there had been no systemic impact on the secure and operationally reliable functioning of TARGET2 in the reporting period.

### Oversight assessment

As reported in the previous issue of the FSR, the comprehensive oversight assessment of the design of TARGET2 against the Core Principles for Systemically Important Payment Systems was completed in early 2009 and the summary of the outcome of the exercise was published.<sup>3</sup>

In the post-assessment phase, the TARGET2 oversight function continuously monitored the compliance of the system with the applicable oversight standards, focusing special attention on the proper follow-up of the few remaining findings of the assessment report, i.e. technical options for real-time synchronisation between the two processing regions and provision of additional collateral in contingency processing, operational overhead costs, change and release management, involvement of users in the future development of the system, as well as cost recovery of the liquidity-pooling functionality. While it is stressed that these findings have no adverse implications for the overall system compliance, the ongoing investigations to address them are promising and suggest that adequate solutions for these points will be found and implemented by the TARGET2 system operator in a timely manner.

### CLS

Since it began operations in September 2002, Continuous Linked Settlement (CLS) has rapidly developed into the market standard for foreign exchange settlement between banks, corporates, non-bank financial institutions and investment funds. A key feature of CLS is the settlement of gross-value instructions with multilateral net funding on a payment-versus-payment basis, also known as PVP. PVP ensures that when a foreign exchange trade in one of the

17 CLS-eligible currencies is settled, each of the two parties to the trade pays out (sells) one currency and receives (buys) a different currency, thus eliminating the foreign exchange (FX) settlement risk for its settlement members. The process is managed by CLS Group Holdings AG and its subsidiary companies, including a settlement bank (CLS Bank) that is regulated by the Federal Reserve Board of New York. Given its multi-currency nature and systemic relevance, the G10 central banks, the ECB and the central banks whose currencies are settled in CLS agreed in 2008 to establish a cooperative oversight arrangement, with the Federal Reserve Board of New York as the primary overseer.

In 2009 the number of CLS participants has continued to grow. This is attributed to the events following the Lehman Brothers collapse in September 2008 and the strong market preference for participants to settle through CLS. In August 2009 there were 59 settlement members, as well as 6,043 third-party participants (banks, corporates, non-bank financial institutions and investment funds) in the system.

### Main developments

Following its launch of new services for the settlement of non-deliverable forwards (NDFs) and OTC credit derivatives in 2008, CLS is currently engaged in a dialogue with its members on extending the foreign exchange business it offers. As reported in the last issue of the FSR, one of these CLS initiatives is the need the creation of a joint venture with ICAP/Traiana (CLSAS, a limited liability company) for the provision of an aggregation service. The rationale behind the new service is the need to address operational risk, consolidate legacy post-trade processes and also reduce post-trade costs caused by high-volume, but low-value foreign currency trades. CLS expects that the aggregation service will not have a negative impact on settlement and funding in the

3 See ECB, "Assessment of the design of TARGET2 against the Core Principles", May 2009.

settlement service both in normal and in pay-in failure situations. This is because the total value of the payment instructions relating to aggregated trades will be equal to the value of those trades prior to being aggregated. The Federal Reserve Board of New York, in its capacity as the regulator of CLS Bank, and the CLS oversight committee have been reviewing the developments concerning the implementation of the new service. The aggregation service is planned to come into operation in December 2009.

In July 2009, CLS also announced a new pricing structure for its settlement service. The aim of the new policy (i.e. the combination of value and volume-based charges) is to support CLS' ability to provide new services, such as CLS aggregation, and at the same time to accommodate its user base needs to reduce the cost of high-volume, but low-value messages.

#### Operational performance

During the reporting period (April-September 2009), the volume of transactions settled through the CLS settlement service recovered slightly. This was due to the increased market activity of CLS participants in the aftermath of the financial market turmoil. Average daily volumes of 250,000 FX trades were settled during this period, with an average daily value equivalent to USD 3.3 trillion. However, there is evidence that the volume has grown in 2009. It should also be noted that CLS had a significant day during that period. On 17 June, 1,067,678 sides were settled for a gross value of USD 5.3 trillion. Interestingly, however, this rise and fall in CLS' settlement volumes did not instigate any notable changes in the share of the two main currencies, namely the US dollar and euro with 44% and 21% respectively. The total euro values settled via CLS in this period amounted to €505 billion, thereby eliminating foreign currency settlement risk of approximately €480 billion.

Despite the gradual growth of the volumes and values of single-currency transactions

settled in CLS, i.e. instructions relating to OTC credit derivatives and NDF transactions, they continued to remain negligible in relative terms when compared with foreign currency settlement.

#### Incidents

Throughout this period, all instructions were settled and all pay-outs were achieved in CLS.

In terms of service provision, the number of external issues impacting CLS' daily timeline was low.

#### OVERSIGHT OF INFRASTRUCTURE SERVICE PROVIDERS

##### SWIFT

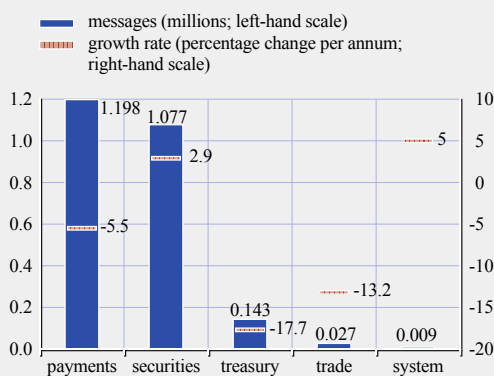
The Society for Worldwide Interbank Financial Telecommunication (SWIFT) provides and maintains a secure and reliable platform facilitating the secure communication and exchange of financial messages between its 9,000 users (banks, securities firms and corporations) located in over 208 countries. Due to its importance for the financial system, its good functioning is a key component of financial stability. For that reason, SWIFT is overseen cooperatively by the central banks from the G10 countries and the ECB. The National Bank of Belgium is the lead overseer in this cooperative arrangement since SWIFT is legally incorporated in Belgium. The cooperating central banks oversee SWIFT on the basis of the High Level Expectations (HLEs), which are customised oversight standards. The HLEs provide the overseers with a clear and explicit framework for reviewing SWIFT's activities, for setting priorities in the oversight activities, and for structuring the dialogue with SWIFT. At the same time, SWIFT uses the HLEs as the basis for carrying out a self-assessment of its core messaging services and infrastructure components.

#### Operational performance

The financial market turmoil also affected SWIFT and, in particular, its FIN messaging traffic. For the first time since its establishment,

**Chart 6.1 SWIFTNet FIN total traffic and growth by market**

(Sep. 2008 – Aug. 2009)



Source: SWIFT.

SWIFT experienced a decline in traffic. The year-to-date (YTD) message volumes (up to August) were 2.4% below 2008 figures, instead of the anticipated growth of 9%. As shown in Chart 6.1, the payments messages (representing 49% of total messages) declined by 5.5%, treasury messages (representing 6% of the total) were down by 17.7%, and trade messages (which represent 1% of all messages) decreased by 13.2%. There was slight growth, however, in securities messages, which increased by 2.9% and represented 44% of total traffic.

By the end of September 2009, the availability of SWIFT core services (FIN, SWIFTNet) was 99.999%, with no major incidents affecting its customers.

#### Main developments

In response to the current decline in traffic and the uncertainty about when and to which extent traffic will pick up again, SWIFT announced, in September 2009, the launch of a business process optimisation programme that will also allow it to save costs.

Furthermore, in 2009 SWIFT continued the development and implementation of the extensive reshaping of its infrastructure.

The Distributed Architecture (DA) project continued to proceed according to plan. In 2009, it included the activation of an additional Command and Control Centre, the integration of an additional operating centre and the initiation of the customer migration towards a zonalised processing environment.<sup>4</sup>

These major developments at SWIFT are closely monitored by the overseers. A primary focus of the overseers is to seek assurance that cost containment or any of the other initiatives do not adversely impact on, or eventually improve, the resilience of the SWIFT infrastructure. Specific areas of oversight activity also include security risk management, enterprise risk management, cyber-defence and IT audit. The evolution of SWIFT traffic growth and its financial position are also closely monitored.

## 6.2 SECURITIES CLEARING AND SETTLEMENT INFRASTRUCTURES

### ESCB-CESR RECOMMENDATIONS

In June 2009 the ESCB and the Committee of European Securities Regulators (CESR) published the recommendations for securities settlement systems and recommendations for central counterparties (CCPs) that aim to increase the safety, soundness and efficiency of the post-trading infrastructure in the EU.<sup>5</sup> They are based on, and are at least as stringent as, the recommendations for securities settlement systems of November 2001 and the recommendations for CCPs of November 2004 issued by the Committee on Payment and Settlement Systems and the Technical Committee of the International Organization of Securities Commissions (CPSS-IOSCO).

The non-binding recommendations are addressed to regulators and overseers, who will use them as a regulatory tool and will strive to

<sup>4</sup> The concept of a multi-zone SWIFT architecture was explained in the December 2008 FSR.

<sup>5</sup> See [http://www.ecb.europa.eu/press/pr/date/2009/html/pr090623\\_en.html](http://www.ecb.europa.eu/press/pr/date/2009/html/pr090623_en.html).

achieve their consistent implementation and a level playing-field for securities settlement systems and CCPs in the EU (see Box 14).

### OTC DERIVATIVES

Important developments regarding market infrastructures for OTC derivatives have taken place in recent months.

Fostered by strong EU public sector support and corresponding industry initiatives, two EU central counterparties for credit default swaps (CDSs) were established in July 2009, namely Eurex Credit Clear (located in the euro area) and Ice Clear Europe (located in the United Kingdom). The Governing Council of the ECB, in its decision of 16 July 2009, welcomed the progress made and clarified that it gives particular priority to the use of euro area infrastructures for the clearing of euro-denominated CDSs, which it will monitor closely. The importance of the availability of euro area infrastructures for OTC derivatives was also underlined in recent analytical work of the Eurosystem, which highlighted the particular systemic risk implications of OTC derivatives markets for the euro area, owing to the important role of the euro as a major currency of denomination of OTC derivatives contracts.<sup>6</sup>

In order to ensure the safe and efficient functioning of CCPs and other OTC derivatives market infrastructures, such as trade data repositories, an adequate regulatory and oversight framework is essential.

In Europe, the ESCB-CESR recommendations for securities settlement systems and central counterparties issued in June 2009 already take

into account a number of specific risks inherent in the clearing of OTC derivatives. In view of the global nature of OTC derivatives markets, the main priority now is to promote a consistent interpretation, understanding and implementation of the relevant oversight standards for CCPs also at the international level. With a view to meeting this objective, a review of the 2004 CPSS-IOSCO recommendations for central counterparties with regard to OTC derivatives was launched in July 2009<sup>7</sup> which will also cover considerations relating to trade data repositories. In addition, a framework to support the effective ongoing global coordination and information-sharing of authorities competent for, or with a legitimate interest in, OTC derivatives infrastructures has been established.<sup>8</sup>

The greatest possible use of CCPs and trade data repositories for OTC derivatives needs to be complemented by an enhanced and broader regulatory framework for OTC derivatives markets. The Eurosystem set out its respective priorities in its contribution to the European Commission's consultation on possible measures to enhance the resilience of OTC derivatives markets.<sup>9</sup> Building on the outcome of the Commission's consultation, on 20 October the European Commission published a Communication on its envisaged future actions for OTC derivatives.

6 The report on "OTC derivatives and post-trading infrastructures" was published in September 2009 on the ECB's website.

7 See <http://www.bis.org/press/p090720.htm>.

8 See <http://www.newyorkfed.org/newsevents/news/markets/2009/ma090924.html>.

9 The Commission's consultation was launched in July 2009 and is available at [http://ec.europa.eu/internal\\_market/financialmarkets/derivatives/index\\_en.htm#communication](http://ec.europa.eu/internal_market/financialmarkets/derivatives/index_en.htm#communication). The Eurosystem published its contribution on 4 September on its websites.

### ESCB-CESR RECOMMENDATIONS FOR SECURITIES SETTLEMENT SYSTEMS AND CENTRAL COUNTERPARTIES IN THE EUROPEAN UNION

On 23 June 2009 the ESCB and CESR published “Recommendations for securities settlement systems and recommendations for central counterparties in the European Union”. The main aim of the ESCB-CESR recommendations is to promote efficient, safe and sound pan-European post-trading arrangements in order to facilitate greater confidence in securities markets, ensure better investor protection, contain systemic risk and foster financial stability. Furthermore, the recommendations seek to improve the efficiency of the market infrastructure, which should in turn promote and sustain wider financial market integration and efficiency in Europe.

#### Background

In 2001 the ECB’s Governing Council and the CESR established a joint Working Group – composed of representatives of the ECB, the national central banks and the securities regulators of the EU – to adapt the 2001 CPSS-IOSCO recommendations for securities settlement systems to the European context in order to take into account, inter alia, the complexity of the arrangements for securities clearing and settlement in Europe, its particular legal environment and the prominence of cross-border transactions. Following the issuance of the CPSS-IOSCO recommendations for CCPs in 2004, the work was extended to also cover these recommendations.

When finishing the work in the course of 2008 and 2009, the ESCB and CESR revised the recommendations, taking into account all recent regulatory and legal developments and other initiatives. In view of the financial stability risk posed by the growing scale of OTC derivatives exposures, the ESCB and CESR decided in December 2008 to address the risks of OTC derivatives when reviewing and finalising the recommendations for CCPs.

The European Commission, the Committee of European Banking Supervisors (CEBS) and relevant market participants and associations were consulted in this work. Two public consultations took place, the first with respect to the general review, and the second on specific changes introduced in relation to OTC derivatives.

#### Scope

The ESCB-CESR recommendations are non-binding, cover central securities depositories (CSDs) and CCPs, and are addressed to regulators and overseers who will use them as a regulatory tool.

It is important to note that while the recommendations no longer cover custodian banks, which nevertheless perform an important function in clearing and settlement, the CEBS, in cooperation with the ESCB and CESR, has conducted further work to ensure a level playing-field. In this respect, the CEBS concluded that the Capital Requirements Directive (CRD) and/or other banking-relevant regulations cover the risks borne by custodians, except where custodian banks internalise settlement activities. Following a call for evidence to assess the materiality of such settlement

and other CCP-like activities, the CEBS concluded that there is little evidence to suggest that action at a European level is needed to address this issue.<sup>1</sup>

### Main differences compared with the CPSS-IOSCO recommendations

As a general principle, the ESCB-CESR recommendations are at least as stringent as the CPSS-IOSCO recommendations. Hence, the ESCB-CESR recommendations will replace the CPSS-IOSCO recommendations in the EU context. In order to keep the linkage between both sets of recommendations as strong as possible, the overall structure has been maintained. This means that the ESCB-CESR recommendations are divided into two parts: part 1 contains 19 recommendations for securities settlement systems and part 2 contains 15 recommendations for central counterparties.

However, compared with the CPSS-IOSCO recommendations, the ESCB-CESR recommendations have added the following aspects in relation to the EU context:

- i) they refer to the need for designation under the Settlement Finality Directive and focus on the harmonisation of EU rules, which is an important issue in the achievement of a single market in financial services in the EU (e.g. by requiring CSDs to be open at least during TARGET2 operating hours; by calling for intraday finality in Europe to facilitate interoperability; by asking competent public authorities to ensure consistent implementation in the EU; and by requiring that denial of access should only be based on risk-related criteria or other criteria as set out in EU law);
- ii) they require higher levels of risk management and transparency in some areas (e.g. requiring the separation of the CCP services into a distinct legal entity; explicitly addressing operational risk stemming from exceptional external events such as man-made and natural disasters; requiring the setting-up of a second site; stipulating that a CCP should develop plausible scenarios that consider the simultaneous crystallisation of different risks; adding a requirement that a CCP should regularly test default procedures; and asking for regularly updated information on services and prices) and add specific requirements for the outsourcing of clearing and settlement activities; and
- iii) they address additional risks with respect to the clearing of OTC derivatives (e.g. CCPs should provide information on the rights of the customers of clearing members with respect to collateral and consult clearing participants on the setting-up of a dedicated clearing fund in the case of a CCP's expansion of activities to new products).

### Outlook

Securities regulators and central banks are expressed their intent to integrate the ESCB-CESR recommendations into their respective assessment framework and/or practices with which they assess the safety, soundness and efficiency of the post-trading infrastructure within their jurisdiction. In some EU countries, first assessments of new systems against these recommendations are already being conducted. In the case of a pan-European system, the respective Memorandum of Understanding (MoU) between overseers had already foreseen

<sup>1</sup> See the CEBS's reports to the ECOFIN Council on custodian banks dated 18 December 2008 and 17 April 2009 ([www.c-ebc.org](http://www.c-ebc.org)).

the replacement of the CPSS-IOSCO recommendations with ESCB-CESR recommendations, once the latter was adopted. It is expected that by end-2011 a first assessment of all systems within the EU will have been completed against the ESCB-CESR recommendations.

In order to achieve a level playing-field, central banks and securities regulators will cooperate with each other, both on a national and on a cross-border basis, to ensure a consistent interpretation of the assessment methodology in particular.

The ESCB and CESR are committed to conducting further work to address, for example, the growing interdependencies between systems and the increased importance of outsourcing.

It is important to note that the CPSS and IOSCO are currently reviewing the application of their recommendations for CCPs to OTC derivatives clearing. A general review of the full set of recommendations is envisaged thereafter. The ESCB and CESR will review the possible impact of these revisions in order to ensure that the ESCB-CESR recommendations continue to be at least as stringent as the CPSS-IOSCO ones.



## IV SPECIAL FEATURES

### A TOWARDS THE EUROPEAN SYSTEMIC RISK BOARD

*The financial crisis has raised questions about the effectiveness of the current supervisory architecture. As a result, policy recommendations for regulatory reform have emerged at the European and global level which aim at enhancing the tools and structures devoted to macro-prudential oversight, as well as at ensuring an effective interplay with the monitoring of individual financial institutions. The overall objective of these policy actions is to strengthen the resilience and robustness of the financial system and thus enhance financial stability.*

*Against this background, this special feature describes the framework being proposed for macro-prudential oversight in the EU and is structured as follows: first, it describes the decisions and actions taken at the international and EU level to strengthen macro-prudential supervision. Second, it elaborates on the envisaged framework for contributing to the safeguarding of financial stability at the EU level. Finally, the processes of the proposed macro-prudential supervisory framework, as well as the challenges for the proposed framework to work effectively, are analysed.*

### INTRODUCTION

A fundamental lesson from the current crisis is the need to reinforce the macro-prudential orientation of financial regulation and supervision, as well as to ensure an effective interplay with the monitoring of individual financial institutions.

Macro-prudential analysis focuses on the financial system as a whole and devotes particular attention to the costs of financial instability to the real economy. It covers the threats to financial stability that stem from common shocks affecting a large part of (or all) institutions, as well as contagion of individual problems, to the rest of the system, as opposed to micro-prudential analysis that focuses on financial institutions individually, including their

liquidity, capital strength and risk management. The macro-prudential approach thus recognises that risks to the financial system may stem from the collective behaviour of financial institutions, from their interaction in financial markets and from the close links between the financial system and the overall economy.

Macro-prudential oversight is devoted to the monitoring, assessment and mitigation of systemic risk, which can originate from sources that are both endogenous and exogenous to the financial system, and is characterised by both cross-sectional and time-related dimensions.<sup>1</sup> The cross-sectional dimension concerns how risks are correlated across financial institutions, markets and infrastructures at a given point in time (e.g. the phenomenon of contagion), while the time-related dimension concerns how systemic risk evolves over time (e.g. the unravelling of imbalances that build up over time).

This perspective is not new and was recognised well before the crisis.<sup>2</sup> Many of the factors intensifying the current crisis had been anticipated in financial stability assessments, notably those conveyed in financial stability reports issued by central banks and supervisors. However, these assessments were often not effective in triggering concrete policy and regulatory responses. Hence the concern that the new framework for contributing to the safeguarding of financial stability should better ensure the translation of financial stability assessments into policy and regulatory responses by the competent authorities, so that risk warnings and, in particular, recommendations are effectively translated into follow-up actions.

1 See J. Fell and G. Schinasi, "Assessing Financial Stability: Exploring the Boundaries of Analysis", *National Institute Economic Review*, No 192, April 2005, for a discussion of the identification of risks for financial stability assessments, and Special Feature B "The concept of systemic risk" in this FSR for an in-depth discussion of the concept of systemic risk, as well as relevant theoretical and empirical research in this field.

2 See A. Crockett, "Marrying the micro- and macro-prudential dimensions of financial stability", *BIS Review* 76/2000, September 2000; and C. Borio, "Towards a macro-prudential framework for financial supervision and regulation?", *CESifo Economic Studies*, Vol. 49, No 2/2003, 2003.

## STRENGTHENING THE MACRO-PRUDENTIAL APPROACH TO OVERSIGHT AND REGULATION

Against this background, as reflected in the policy recommendations for regulatory and supervisory reform emerging from European and global fora, there is a consensus to move in direction of enhancing the tools and structures devoted to macro-prudential oversight and ensuring an effective interplay with micro-prudential supervision. This consensus has resulted in various actions being taken at the international and EU level (see also Box A.1 for the measures considered in the United States).

At the international level, a clearer framework is emerging for identifying risks to financial stability, as well as for designing and enforcing minimum regulatory standards. In this context, two key international bodies have an important role to fulfil, namely the International Monetary Fund (IMF), with its focus on surveillance, and the recently established Financial Stability Board (FSB, which replaced the Financial Stability Forum), focusing on policy coordination.<sup>3</sup> More specifically, the G20 called on the FSB to develop macro-prudential tools in cooperation with the Bank for International Settlements (BIS) so as to identify and take account of macro-prudential risks across the financial system and limit the build-up of systemic risk for regulated entities. The FSB has also been asked to cooperate with the IMF on the conduct of early warning exercises.

In the EU, in November 2008, the European Commission commissioned a High-Level Group chaired by Jacques de Larosière to provide advice on the future of European financial regulation and supervision. The High-Level Group on Financial Supervision in the EU published its report in February 2009 (the “de Larosière Report”).<sup>4</sup>

Based on the recommendations made in the de Larosière Report and on the subsequent Commission Communication on Financial Supervision of 27 May 2009, the ECOFIN Council of 9 June 2009 and the European Council of 17 and 18 June 2009 decided on the establishment of a new EU supervisory

architecture based on a two-pillar structure comprising the European Systemic Risk Board (ESRB), responsible for macro-prudential oversight, and the European System of Financial Supervisors (ESFS), focusing on micro-prudential supervision. The latter will consist of a network comprising three new European Supervisory Authorities (ESAs) for each financial sector and national supervisors.<sup>5</sup> On 23 September 2009, the European Commission adopted: (1) a proposal for a Regulation of the European Parliament and of the Council on Community macro-prudential oversight of the financial system and establishing a European Systemic Risk Board; and (2) a proposal for a Council Decision entrusting the European Central Bank with specific tasks concerning the functioning of the European Systemic Risk Board.<sup>6</sup> The Commission’s proposals will have to be adopted by both the European Parliament and the Council or the Council only, depending on the applicable legislative procedure. The ECOFIN Council of 20 October 2009 agreed in substance on these proposals (which are now being considered by the European Parliament as well). At its meeting on 29 and 30 October 2009, the European Council recognised the progress made thus far and reiterated the importance of the swift continuation of the work on the establishment of the ESAs, in order to reach a general approach on these proposals. The European Council urged the ECOFIN Council to reach agreement by December 2009 on a complete package setting up a new supervisory structure in the EU. The ECB issued its formal opinion on the Commission’s proposals on 26 October 2009.<sup>7</sup>

3 The FSB was established at the G20 summit in London on 4 April 2009. See [www.financialstabilityboard.org](http://www.financialstabilityboard.org).

4 The de Larosière Report is available on the Commission’s website ([www.europa.eu](http://www.europa.eu)).

5 The new ESAs will be the European Banking Authority (EBA), the European Insurance and Occupational Pensions Authority (EIOPA) and the European Securities and Markets Authority (ESMA). They will replace the existing so-called “Level 3 Committees”, i.e. the Committee of European Banking Supervisors (CEBS), the Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS) and the Committee of European Securities Regulators (CESR) respectively.

6 Available on the Commission’s website ([www.europa.eu](http://www.europa.eu)).

7 CON/2009/88, available under [http://www.ecb.europa.eu/ecb/legal/opinions/html/act\\_10667\\_amend.en.html](http://www.ecb.europa.eu/ecb/legal/opinions/html/act_10667_amend.en.html).

The ECB expressed its broad support to the proposed legal framework for the ESRB. It also recalled that it stands ready to act as the Secretariat of the ESRB, to support the ESRB and to bring to the benefit of the ESRB, with the participation of all the members of the ECB's General Council, the macroeconomic, financial and monetary expertise of all EU central banks. Some specific comments were provided on the governance and structure of the ESRB, including the Steering Committee and the Advisory Technical Committee. In this respect, the point was made that the composition of the Steering Committee should reflect that of the General Board with the inclusion of five central bank members (in addition to the Chair and Vice-Chair of the ESRB), as stated in the Commission's proposal.

#### Box A.1

##### MACRO-PRUDENTIAL ARRANGEMENTS CONSIDERED BY THE UNITED STATES

As part of the proposals released in the white paper entitled "Financial Regulatory Reform. A new Foundation: Rebuilding Financial Supervision and Regulation" in June 2009, which is now being discussed with Congress, the US Treasury announced the setting-up of a Financial Services Oversight Council (FSOC) in charge of systemic risk oversight.

The Council will be in charge of identifying emerging risks, as well as gaps in regulation, referring them to the relevant supervisory bodies with the authority to respond, and coordinating the responses (the FSOC is also intended to improve inter-agency cooperation in general, including the resolution of jurisdictional disputes).

It will be composed of eight members, namely the Secretary of the Treasury, acting as Chairman, and the heads of the seven federal financial regulators. The Council will be supported by dedicated staff from the Treasury.

To facilitate the monitoring of emerging threats that activities in financial markets may pose to financial stability, the Council will have the authority, through its permanent secretariat, to require periodic and other reports from any US financial firm solely for the purpose of assessing the extent to which a financial activity or financial market in which the firm participates poses a threat to financial stability. In the case of federally regulated firms, the Council will, wherever possible, rely upon information that is already being collected by members of the Council in their role as regulators.

Under the US Treasury's proposals, the Council will also have the authority to recommend the designation of any financial firm as a "Tier 1 Financial Holding Company" (Tier 1 FHC), i.e. financial firms – whether or not they own a bank – considered systemically important due to their size, leverage and interconnectedness, which will be subject to consolidated supervision by the Federal Reserve with a macro-prudential focus and stricter prudential standards. The Federal Reserve should consult the Council when setting both prudential standards and risk-management standards for systemically important payment, clearing and settlement systems and activities.

The Financial Services Oversight Council will prepare an annual report to Congress on market developments and potential emerging risks to financial stability.

In the context of the legislative discussions on the regulatory and supervisory reforms, the two houses of Congress are putting forward amendments to the US Treasury's proposals, as well as elaborating alternatives. In particular, the Senate Banking Committee has proposed the setting-up of a more powerful oversight council, which is to be called the "Agency for Financial Stability". The new body, which is to be chaired by a full-time presidential appointee, would be in charge of identifying firms of systemic relevance, would set prudential standards (with incentives to reduce risks created by size and complexity), would have the authority to break up firms that pose a threat to financial stability and would be endowed with resolution powers.

#### ESTABLISHMENT, ORGANISATION AND OBJECTIVES OF THE EUROPEAN SYSTEMIC RISK BOARD<sup>8</sup>

According to the proposals adopted by the European Commission in September 2009, the ESRB will be established as an independent body, without legal personality, responsible for macro-prudential oversight across the EU financial system.

The internal organisation of the ESRB will include (i) a General Board, (ii) a Steering Committee and (iii) a Secretariat. The General Board will be the main decision-making body of the ESRB and will be composed of voting and non-voting members. The voting members will be the Governors of the EU national central banks, the President and the Vice-President of the ECB, a member of the European Commission, and the chairpersons of the three ESAs. The non-voting members of the General Board will be a high-level representative per Member State of the competent national supervisory authorities and the President of the Economic and Financial Committee (EFC). The decisions will be taken by simple majority, with the exception of decisions concerning the publication of a warning or recommendation. In such cases, a majority of two-thirds of the votes is required.

A Steering Committee will assist in the decision-making process of the ESRB by preparing the meetings of the General Board, reviewing the documents to be discussed and monitoring the progress of ongoing work.<sup>9</sup>

The ECB will act as the Secretariat and therefore provide analytical, statistical, logistical and

administrative support to the ESRB. This includes, among other activities, the preparation of the meetings, the collection and processing of qualitative and quantitative information, and the conduct of analysis and assessments necessary for the fulfilment of the ESRB tasks. The Secretariat will also support the Advisory Technical Committee.

Furthermore, the ESRB will be supported by an Advisory Technical Committee, which will, upon request by the General Board, provide advice and assistance to the General Board on a number of issues that are within the scope of the ESRB.

The objectives of the ESRB are threefold. The first objective is to develop a framework for macro-prudential oversight in Europe so as to better address the issue of fragmented risk analysis at national level. The ESRB should provide high-quality macro-prudential assessments, as well as issue risk warnings and recommendations whenever potential imbalances may pose a threat to financial stability. The identification of risks with a systemic dimension and the prevention or mitigation of these risks' impact on the EU financial system, through the issuance of prompt early warnings, can be characterised as the key task of the ESRB.

<sup>8</sup> This section is based on the Commission's legislative proposals, as adopted on 23 September 2009. The Commission's proposals are subject to changes before the final adoption of the legal acts within the legislative process.

<sup>9</sup> The Steering Committee will be formed by the Chair and Vice-Chair of the General Board, the chairpersons of the three ESAs, the President of the EFC, a member of the Commission and five members of the General Board who are also members of the General Council of the ECB.

The second objective of the ESRB is to enhance the effectiveness of early warning systems by improving the interaction between micro- and macro-prudential analyses.

The final objective of the ESRB is to translate risk assessments into action by the relevant authorities.

#### RISK ASSESSMENTS AND DELIBERATIONS OF THE EUROPEAN SYSTEMIC RISK BOARD – ENVISAGED PROCESSES

Amid this broad range of responsibilities, the preparation of high-quality risk warnings emerges as a core output of the ESRB. It relates to all other responsibilities in the sense that, on the one hand, risk warnings should result from the risk surveillance and assessment tasks, and on the other hand, it could require follow-up remedial actions and the monitoring of their implementation.

As such, the core process of selecting which risks may merit a warning by the ESRB would likely need to follow a decision-tree-type mode of working, based on the two main components of macro-prudential analysis: risk surveillance and risk assessment. In such a working mode, the process would begin with monitoring and surveillance activities aimed at detecting potential sources of risk, especially financial vulnerabilities, i.e. weak points which, if unearthed, could lead to a disruption or failure in part of the financial system and potentially a financial crisis. This task would also involve sketching out potential risk scenarios connected with financial vulnerabilities and identifying potential events (or shocks) that could trigger these scenarios. Only a systematic and rigorous monitoring of potential sources of risk and vulnerabilities – based on a comprehensive information base – can help to ensure that risks are not missed or overlooked.

Starting from a broad spectrum of potential sources of risk and vulnerability, both within and outside the EU financial system, the risk

surveillance phase would be complemented by relevant data and expert knowledge on the likelihood and severity of the risks identified, with a view to separating the potentially material risks from the immaterial ones. This exercise would need to be cross-checked and complemented with information gathered through market intelligence activities and expert knowledge at the national level.

The following step in the core process would be the actual risk assessment, namely the evaluation of the possible severity of the impact of adverse risk scenarios identified on the functioning of the EU financial system, as well as an evaluation of the ability of the financial system to absorb shocks. As highlighted by the financial crisis, this exercise should also include the examination of plausible interconnections between vulnerabilities and allow for the assessment of scenarios where risks are combined; it should aim at providing a quantitative impact assessment of such potential risk scenarios. Some of the risks identified at this stage of the process could require examination in greater detail, through drill-down analysis. This would include estimates of the likelihood of systemic events occurring and the impact of risks, should they crystallise, on the financial system (e.g. via macro stress-testing) and/or the impact on the broader economy (e.g. foregone output). Finally, risk assessments should also entail an examination of the ability of the financial system to absorb the identified shocks, e.g. through existing capital buffers or considering the potential to grow buffers in the future through profit retention.

This part of the risk assessment process should support the identification and prioritisation (i.e. the assessment of materiality) of risks for financial stability in the EU. Detailed risk assessments should allow the formation of well-informed judgements on whether the identified risks merit risk warnings and, if so, whether the risk warnings should be accompanied by recommendations or advice on the measures to be taken to address the risks.

In essence, this funnelling or decision-tree process would begin with drawing up a long list of potential risks, aimed at minimising type-II errors – i.e. the likelihood that the ESRB fails to identify and issue warnings about risks that subsequently do materialise. It would be followed by the risk assessment, which would contribute to reducing the list of possible risks and vulnerabilities into a smaller set of risks that are perceived as material on the basis of relevant data and qualitative assessments. The ensuing drill-down analysis, mostly of a quantitative nature, should aim at minimising type-I errors – i.e. the possibility of identifying risks that subsequently do not crystallise or, if they do, prove not to be material – by assessing their plausibility and potential severity. This step of the process would provide elements to support deliberations regarding risk warnings and could also contribute with insights regarding appropriate mitigating actions and related policy recommendations, if deemed necessary.

It hardly needs mentioning that financial systems – comprising many and changing interlinkages – are complex and financial innovation can be expected to continue to add to this complexity. On account of this, the set of tools for systemic risk surveillance and assessment must be constantly re-evaluated, modified or replaced. This also implies that the risk assessment framework should never rely on a single model or indicator, but should rather try to draw upon a wide set of tools and information, including market intelligence efforts.

#### CHALLENGES FOR THE NEW FINANCIAL STABILITY FRAMEWORK

The effectiveness of the proposed new EU financial stability framework will hinge on a number of aspects, which will require further fleshing out.

First, an effective mechanism for cooperation and information exchange between the ESRB and the ESFS needs to be established, beyond their strong institutional links, (also through cross-membership) to ensure the appropriate

interplay in the new EU supervisory architecture between the macro-prudential and micro-prudential levels. In particular, in terms of access to data, the foreseen regulation envisages the ESRB having the ability to request the ESAs to provide information in summary or collective form and, should this information not be available, to request data directly from national supervisory authorities. As some individual institutions can be systemically important, the ESRB may also have access to individual data upon a reasoned request to the ESAs.

In terms of cooperation, the ESFS should benefit from the ESRB's insights into the macro-prudential environment. In some circumstances, the ESFS could also contribute to the implementation of ESRB policy recommendations. In order to structure the interplay between the ESRB and the ESFS, cooperation and information-sharing procedures will need to be put in place, including the necessary confidentiality safeguards.

Second, an essential task of the ESRB is to issue risk warnings and recommendations that are addressed to the Community as a whole, to one or more Member States, to one or more ESAs and to one or more national supervisory authorities. An important factor supporting this task will be the enhancement of the analytical tools necessary to support the systemic risk analysis. The risk warnings and recommendations made by the ESRB will not be legally binding; they will have a so-called “act or explain” nature. This implies that, if the addressee agrees with the recommendation, it must communicate the actions it will undertake to follow the recommendation. If the addressee does not agree with a recommendation, the addressee must explain the reasons for not following up. The fact that the ESRB may decide on a case-by-case basis whether to make a warning or recommendation public may increase the pressure to follow up on the recommendation, but it could also trigger adverse financial market reactions. Hence, given that it has no legal powers, the ESRB will need to rely on a combination of (i) solid technical analysis,

(ii) credibility and (iii) peer pressure as the sources of its legitimacy.

Finally, according to the proposed regulation, the ESRB shall be accountable to the European Parliament and the ECOFIN Council. It is envisaged that such reporting will take place at least annually. While the framework is still under consideration, it can be presumed to allow for flexibility in the practical implementation of the reporting obligations. With respect to the European Parliament, the reporting of the ESRB should be clearly separated from the reporting of the ECB on monetary policy. The practical arrangements will need to be agreed upon by the ECOFIN Council, European Parliament and ESRB.

#### CONCLUDING REMARKS

The establishment of the ESRB represents a great step forward in the enhancement of macro-prudential analysis and oversight in the EU. The credibility and effectiveness of the ESRB, however, will depend, to a large extent, on the quality of its risk assessments and on its ability to translate those into concrete and adequate policy recommendations and, ultimately, actions. As such, it is essential that the challenges highlighted here are addressed in an appropriate manner, facilitating the functioning of the new EU supervisory architecture. In addition, due consideration should also be given to the developments taking place at the international level, bearing in mind that the crisis has confirmed the global dimension of the financial system.

## B THE CONCEPT OF SYSTEMIC RISK

*Research, in conjunction with market intelligence and current policy analysis, can make an important contribution to the understanding of systemic risk. It is one element in learning the lessons from the financial crisis and in supporting ongoing efforts to further develop the macro-prudential dimension of financial supervision. This special feature briefly discusses the concept of systemic risk and surveys the existing research literature. Research in the last two decades has made significant progress in analysing systemic risk, in particular contagion risks. It has also documented the relevance of macroeconomic shocks and started to analyse endogenously pro-cyclical behaviour from the perspective of systemic risk. Some of the analyses described important features of the present crisis. Substantial further research efforts, however, need to be made, inter alia, to develop aggregate modelling frameworks that capture realistic features of financial instability, to better understand the endogenous build-up and unravelling of widespread imbalances and to assess the systemic importance of non-bank financial intermediaries.*

### INTRODUCTION

The financial and economic crisis that has shaken the world economy for more than two years illustrates the relevance of systemic risk. Broadly speaking, it refers to the risk that financial instability becomes so widespread that it impairs the functioning of a financial system to the point where economic growth and welfare suffer materially.

The objective of this special feature is to characterise the phenomenon of systemic risk from an academic research perspective. In so doing, some important elements of the concept of systemic risk are described and the academic research literature is surveyed.<sup>1</sup> The feature also points out where research explained factors that played a role in the present crisis, either before it broke out or thereafter, but it does not aim at providing an overview of the crisis. The next

section contains the conceptual discussion. The third section surveys theoretical research and the fourth section empirical research on systemic risk. The last section concludes and proposes some lines for future research.

### CONCEPT

There is no commonly accepted definition of systemic risk at present. One perspective is to describe it as the risk of experiencing a *strong* systemic event. Such an event adversely affects a number of systemically important intermediaries or markets (including potentially related infrastructures).<sup>2</sup> The trigger of the event could be an *exogenous* shock (idiosyncratic, i.e. limited in scope, or systematic, i.e. widespread), which means from outside the financial system. Alternatively, the event could emerge *endogenously* from within the financial system or from within the economy at large. The systemic event is *strong* when the intermediaries concerned fail or when the markets concerned become dysfunctional (in theoretical terms this is often a non-linearity or a regime change). One can distinguish between a “horizontal” perspective of systemic risk, where attention is confined to the financial system, and a “vertical” perspective of systemic risk in which the two-sided interaction between the financial system and the economy at large is taken into account. Ideally, the severity of systemic risk and systemic events would be assessed by means of the effect that they have on consumption,

<sup>1</sup> For extensive discussions of the concept of systemic risk and comprehensive literature surveys on which this special feature heavily draws, see O. de Bandt and P. Hartmann, “Systemic risk: A survey”, *ECB Working Paper Series*, No. 35, November 2000, and O. de Bandt, P. Hartmann and J. Peydró, “Systemic risk in banking: An update”, *ECB Working Paper Series*, forthcoming, and in A. Berger, P. Molyneux and J. Wilson (eds.), *Oxford Handbook of Banking*, Oxford University Press, 2009. For reasons of space, this feature cannot survey the more practical and descriptive literature. Nor does it intend to derive policy recommendations for macro-prudential supervision or regulation.

<sup>2</sup> The failure of a large and complex financial institution (such as that of Lehman Brothers in September 2008) implies a particularly high risk of a systemic event. How to identify large and complex banks is discussed in ECB, “Identifying large and complex banking groups for financial stability assessment”, *Financial Stability Review*, December 2006.

investment and growth or economic welfare broadly speaking.<sup>3</sup>

The important distinctions between idiosyncratic or systematic factors, exogenous or endogenous triggers and sequential or simultaneous impacts illustrate the complexity of this phenomenon. One way to reduce the dimensions resulting from the combination of these elements is to limit attention to three main “forms” of systemic risk: the contagion risk, the risk of macro shocks causing simultaneous problems and the risk of the unravelling of imbalances that have built up over time. These three forms of risk are not mutually exclusive and may materialise independently or in conjunction with each other. Contagion usually refers to a supposedly idiosyncratic problem that becomes more widespread in the cross-sectional dimension, often in a sequential fashion. An example is one bank failure causing the failure of another bank, even though the second bank initially seemed solvent. The second form of systemic risk refers to a widespread exogenous shock that negatively affects a range of intermediaries and/or markets in a simultaneous fashion. For example, it has been observed that banks are vulnerable to economic downturns. The third form of systemic risk refers to the endogenous build-up of widespread imbalances in financial systems over time, as in the case of a lending boom. The subsequent (endogenously or exogenously caused) unravelling of the imbalance may adversely affect many intermediaries and/or markets at the same time. The last two forms of systemic risk are particularly relevant for the pro-cyclicality of financial systems, although contagion can also play a role in it.

Behind the three forms of systemic risk are a variety of market imperfections, such as asymmetric information, externalities and the public-good character of systemic stability, incomplete markets, etc. They lead to a greater fragility of financial systems in comparison with other economic sectors, because of (i) the information intensity and inter-temporal nature of financial contracts, (ii) the balance-sheet structures of financial intermediaries

(often exhibiting high leverage and maturity mismatches) and (iii) the high degree of interconnectedness of wholesale financial activities. The combination of the above market imperfections with the three features of financial systems paves the way for powerful feedback mechanisms, amplification and non-linearities. Research supporting macro-prudential supervision needs to capture situations of “true” instability by explicitly modelling these features and imperfections and how they may lead to *strong* systemic events.

The survey of research can be structured according to the three forms of systemic risk described above.

## THEORETICAL RESEARCH

### CONTAGION

Academic research has produced a wealth of papers on contagion phenomena. Most of this literature deals with contagion among banks, within large-value payment systems and among major financial markets.<sup>4</sup>

It is well known that banks which are not covered by deposit insurance schemes are prone to runs of retail depositors. These runs can be contagious if depositors are imperfectly informed and update their beliefs about the health of their own bank on the basis of on runs they observe on other banks.<sup>5</sup> The introduction of a well-designed deposit insurance scheme, as present in most industrialised countries today, would shut this channel down. This is probably

<sup>3</sup> This description of systemic risk is very similar to the definition of financial stability used in this FSR (see the Preface). The two are mirror images; the former describes the risk of widespread instability, whereas the latter describes stability.

<sup>4</sup> In this special feature only bank and payment system contagion will be covered. For an overview of financial market contagion research, see ECB, “Financial market contagion”, *Financial Stability Review*, December 2005. For a survey of the macroeconomic currency contagion literature, which is mainly relevant for fixed exchange rate regimes, see de Bandt and Hartmann (2000), op. cit.

<sup>5</sup> Y. Chen, “Banking panics: The role of the first-come, first-served rule and information externalities”, *Journal of Political Economy*, 1999.

the reason why this was not a major transmission channel in the present crisis.<sup>6</sup>

By contrast, interbank markets have been a primary locus of systemic risk in the present crisis. The research literature has pointed to the dangers of unsecured interbank markets in times of instability since about the mid-1990s.<sup>7</sup> One channel for contagion is through the physical exposures among banks in these markets. If they tend to experience differential liquidity shocks (e.g. through depositor withdrawals or changes in asset valuations that differ across banks), they benefit from lending to each other rather than each of them holding more liquid assets *ex ante*. In certain severe realisations of liquidity needs, however, the overall amount of liquid assets in the system may not be sufficient to honour all interbank market contracts and contagious bank failures may occur.<sup>8</sup> In other words, the benefits of sharing risk among banks come at the cost of contagion risk.<sup>9</sup> This research also found that interbank lending structures that are more complete or diversified (many banks lend to each other) should be more stable than incomplete structures, where different banks lend to each other in chains or a few banks distribute liquidity to the other banks (money centre banks).

Subsequent research has applied network theory, where banks are the “nodes” and interbank loans the “arcs”, arguing that banks may sometimes be willing to provide liquidity assistance to each other in order to avoid the collapse of the whole network.<sup>10</sup> If there is moral hazard in banks and interbank linkages are endogenous, then interbank contagion must be a rare phenomenon since banks would otherwise not lend to each other. Contrary to previous research, however, in such an environment the contagion risk seems to be larger when lending structures are more complete.<sup>11</sup>

Another channel for interbank contagion emerges through information problems, notably asymmetric information leading to adverse selection phenomena.<sup>12</sup> In fact, it has been observed that adverse selection (the inability of banks to distinguish between good and bad assets or counterparties leading them to stop lending

and hoard liquidity) rendered money markets dysfunctional and thereby constituted a powerful channel for the transmission of the present crisis.<sup>13</sup> For example, if it becomes known that there is a significant portion of impaired assets and banks are privately informed about the risk of their own assets, then the resulting increase of interbank rates drives out safer banks that need to borrow liquidity. Rates will increase further since only an adverse selection of riskier banks continues to borrow. This in turn may motivate banks with a liquidity surplus to stop lending to these borrowers and instead hoard liquidity, causing the market to break down.<sup>14</sup>

6 Where deposit insurance is partial, bank runs can still happen, as the Northern Rock case illustrates.

7 J.C. Rochet and J. Tirole, “Interbank lending and systemic risk”, *Journal of Money, Credit and Banking*, 1996.

8 F. Allen and D. Gale, “Financial contagion”, *Journal of Political Economy*, 2000; and X. Freixas, L. Parigi and J.C. Rochet, “Systemic risk, interbank relations and liquidity provision by the central bank”, *Journal of Money, Credit and Banking*, 2000.

9 There is another trade-off in such short-term wholesale funding markets related to incentives (R. Huang and L. Ratnovski, “The dark side of bank wholesale funding”, *Federal Reserve Bank of Philadelphia Working Paper*, No 09-3, September 2008). On the one hand, the possibility that short-term financiers deny to roll over debt should impose discipline on the investment behaviour of borrowers. On the other hand, when assets are arm’s length, evaluated by intermediaries (e.g. credit rating agencies providing frequent public signals) and supposedly tradable (reducing liquidation costs), the incentives for wholesale financiers to collect costly information decline and the discipline vanishes. If a noisy public signal suggests a problem under these circumstances, then wholesale financiers may abruptly withdraw their funding.

10 Y. Leitner, “Financial networks: Contagion, commitment, and private sector bailouts”, *Journal of Finance*, 2005.

11 S. Brusco and F. Castiglionesi, “Liquidity coinsurance, moral hazard and financial contagion”, *Journal of Finance*, 2007.

12 M. Flannery, “Financial crises, payment system problems and discount window lending”, *Journal of Money, Credit and Banking*, 1996.

13 R. Ferguson, P. Hartmann, F. Panetta and R. Portes, “International financial stability”, *Geneva Report on the World Economy*, No 9, November 2007; N. Cassola, M. Drehmann, P. Hartmann, M. Lo Duca and M. Scheicher, “A research perspective on the propagation of the credit market turmoil”, *ECB Research Bulletin*, No 7, ECB, June 2008.

14 F. Heider, M. Hoerova and C. Holthausen, “Liquidity hoarding and interbank market spreads: The role of counterparty risk”, *ECB Working Paper Series*, forthcoming. This mechanism combines an aggregate shock (see next sub-section), the worsening of credit conditions leading to higher rates, with contagion since risky banks impose an externality on safe banks that may prevent the latter from borrowing the liquidity they need. For contagion through adverse selection more generally, see S. Morris and H. Shin, “Contagious adverse selection”, mimeo, Princeton University, May 2009 (available at: <http://www.princeton.edu/~hsshin/www/ContagiousAdverseSelection.pdf>).

Contagion can also happen in large-value payment systems. The literature has very much focused on trade-offs between risk and efficiency, comparing different ways in which the settlement process can be organised in these systems. Pure gross systems, in which each payment is settled independently in real time, would not be subject to contagion risk, but they tend to be costly for banks, which have to hold a lot of liquid funds that cannot be invested. Pure net settlement systems can be subject to extensive systemic risk, because the netting of different payments against each other and infrequent settlements can lead to an accumulation of exposures.<sup>15</sup> Gross settlement systems, however, can be subject to “gridlock” and costly payment delays. When the opportunity costs of liquidity in terms of foregone interest are high, or when banks have doubts about the solvency of their counterparties, they may choose not to make pay-ins. In an extreme case, a system may grind to a halt.<sup>16</sup>

Most real-world systems are therefore hybrid and have risk management features that try to balance efficiency and risk. For example, real-time gross settlement systems allow for intraday overdrafts that are either collateralised or priced. Alternatively, netting systems have caps and collateral requirements, and settle in frequent cycles. In fact, in the present crisis, payment and settlement system problems did not play a significant role. The main issues with respect to market infrastructures emerged in the clearing and settlement of over-the-counter (OTC) derivatives, which is, however, a relatively new research field.<sup>17</sup>

The recent research literature has put a great deal of emphasis on liquidity problems and endogenously emerging risks. For example, the specific knowledge that banks possess about their borrowers makes bank loans particularly illiquid. When a bank fails, this knowledge is destroyed, the common pool of liquidity shrinks and the resulting shortage may cause other banks to fail.<sup>18</sup> As the number of bank failures increases, the value of such illiquid bank assets

goes down (“cash-in-the-market pricing”), worsening the problems in the banking system.<sup>19</sup>

Endogenously emerging risks and liquidity problems are made worse by contagious “fire sales” of assets in stress situations. For example, when a variety of financial intermediaries (not only banks) hold similar asset portfolios, problems in some may force them to sell illiquid assets. This will put downward pressure on asset values, causing losses in other intermediaries, forcing them, in turn, to sell illiquid assets.<sup>20</sup> Moreover, dangerous downward spirals of asset prices and quantities can emerge through adverse interactions between market liquidity (ease of trading) and funding liquidity (availability of financing).<sup>21</sup> Traders providing liquidity to markets may fund their activities through collateralised borrowing. When there is an adverse shock to asset prices, financiers will increase margin requirements, making funding more difficult and constraining traders’ ability to provide market liquidity. The reduced market liquidity, in turn, leads to further asset price declines and more expensive funding. Such vicious downward spirals in liquidity played a significant role in the present crisis.

15 X. Freixas and B. Parigi, “Contagion and efficiency in gross and net interbank payment systems”, *Journal of Financial Intermediation*, 1998.

16 C. Kahn, J. McAndrews and W. Roberds, “Settlement risk under gross and net settlement”, *Journal of Money, Credit and Banking*, 2003.

17 D. Duffie and X. Zhu, “Does a central clearing counterparty reduce counterparty risk?”, *Rock Center for Corporate Governance at Stanford University Working Paper*, No 46, May 2009.

18 D. Diamond and R. Rajan, “Liquidity shortages and banking crises”, *Journal of Finance*, 2005.

19 V. Acharya and T. Yorulmazer, “Cash-in-the-market pricing and optimal resolution of bank failures”, *Review of Financial Studies*, 2008.

20 R. Cifuentes, H. Shin and V. Ferrucci, “Liquidity risk and contagion”, *Journal of the European Economic Association*, 2005.

21 M. Brunnermeier and L. Pedersen, “Market liquidity and funding liquidity”, *Review of Financial Studies*, 2008. The mechanism is not only relevant for contagion, but also amplifies the procyclicality of financial systems (the third form of systemic risk surveyed below).

## MACROECONOMIC SHOCKS

Many financial crises in history have been associated with macroeconomic downturns. Banks are vulnerable to them because credit risk materialises on their asset side, whereas their liabilities (deposits) remain unaffected. If also liabilities were to be contingent on the state of the macroeconomy and therefore depositors would share the burden of asset losses, then banks' vulnerability to macro shocks may be attenuated.<sup>22</sup> Macro shocks and contagion can also interact, because banks that are weakened by an aggregate shock are more vulnerable to contagion.<sup>23</sup>

Other aggregate shocks that can bring down a larger number of intermediaries at the same time include widespread crashes of, or the evaporation of liquidity in, major financial markets.

## UNWINDING OF IMBALANCES

History suggests that systemic financial crises can also emerge through the endogenous build-up and unravelling of widespread imbalances.<sup>24</sup> Financial behaviour tends to be pro-cyclical in that, in good times, consumption and/or (financial or real) investment increase, generating income which fuels the financing of more consumption and/or investment, with increasing risks being neglected. Even small (exogenous or endogenous) events can then lead to a repricing of risk and an end of the credit boom, which then unravels, adversely affecting many intermediaries and/or markets at the same time.

The research literature has highlighted at least four reasons why widespread imbalances can build up over time, making financial systems systemically vulnerable. First, there are strong incentives for herd behaviour in financial markets, which leads intermediaries or other agents to invest in similar risks. If relative returns of different investments are highly uncertain, then investors may infer the most promising opportunities from the behaviour of other investors. Such information externalities can lead to rational herding waves.<sup>25</sup> Moreover, investment managers and loan officers may

mimic others when their own evaluation, pay or reputation depends on their performance relative to the rest of the market.<sup>26</sup>

Second, low interest rates across the maturity spectrum may encourage risk-taking, and some observers argue that this was a factor in the build-up to the present crisis. For example, as interest rates go down, incentives for banks to screen borrowers diminish.<sup>27</sup> Alternatively, low rates increase collateral values, such as real estate prices.<sup>28</sup>

Generally, collateral enhances the borrowing capacity in the economy and may therefore contribute to leverage cycles. When an industry benefits from a positive shock, the enhanced financing of investment bids up collateral values, which in turn allows more borrowing and investment. Moreover, other industries that possess similar collateral also benefit from the collateral price increases, borrow more, invest more and thereby "widen" the leverage cycle.<sup>29</sup> Further amplification may emerge from softening and tightening of lending standards over the cycle due to changing investor sentiment or moral hazard.<sup>30</sup>

22 M. Hellwig, "Liquidity provision, banking, and the allocation of interest rate risk", *European Economic Review*, 1994.

23 Y. Chen (1999), op. cit.

24 H. Minsky, "A theory of systemic fragility", in E. Altman and A. Sametz, *Financial Crises: Institutions and Markets in a Fragile Environment*, Wiley, 1977; and C. Kindleberger, *Manias, Crashes and Panics: A History of Financial Crises*, Macmillan, 1978.

25 A. Banerjee, "A simple model of herd behaviour", *Quarterly Journal of Economics*, 1992; S. Bikhchandani, D. Hirshleifer and I. Welch, "A theory of fads, fashions, customs and cultural changes in informational cascades", *Journal of Political Economy*, 1992.

26 D. Scharfstein and J. Stein, "Herd behaviour and investment", *American Economic Review*, 1990.

27 G. Dell'Arricia and R. Marquez, "Lending booms and lending standards", *Journal of Finance*, 2006.

28 For further theoretical discussion, see Chapter 9 on "Bubbles and crises" in F. Allen and D. Gale, *Understanding Financial Crises*, Oxford University Press, 2007.

29 N. Kiyotaki and J. Moore, "Balance sheet contagion", *American Economic Review*, 2002.

30 A. Fostel and J. Geanakoplos, "Leverage cycles and the anxious economy", *American Economic Review*, 2008; A. Shleifer and R. Vishny, "Unstable banking", *Journal of Financial Economics*, forthcoming; and M. Ruckes, "Bank competition and credit standards", *Review of Financial Studies*, 2004.

Fourth, the theoretical literature argues that financial safety net provisions can lead to moral hazard and greater risk-taking. For example, risk-insensitive deposit insurance lowers depositors' incentives to monitor bank risks.<sup>31</sup> Moreover, the riskier the bank the higher the value of the insurance.<sup>32</sup> Similar effects could emerge from public bailouts and "lending of last resort", but some positive level of moral hazard may also be necessary to contain systemic risk.<sup>33</sup> Since monetary policy cannot discriminate across agents and since agents may anticipate emergency reductions of interest rates in a crisis, different agents may choose similar illiquid and risky investments.<sup>34</sup>

## EMPIRICAL RESEARCH

### CONTAGION

The early literature has tried to capture contagion risk with event studies of the effects of bank failures on the stock prices of other banks, mainly using data for the United States. For a number of medium to large failures, some nationwide effects could be identified, whereas in other cases the effects remained within the same region.<sup>35</sup> In broader US studies, the "bad news" events are loan-loss reserve, dividend reduction or regulatory enforcement announcements. Results on contagion effects are mixed, depending on the type of banks considered.<sup>36</sup> Sometimes even competitive effects (or "flight to quality") can emerge, in which some banks in the same region benefit from the problems of others. A series of other papers, however, argues that adverse stock market reactions were more related to similar exposures across the banks considered (for example to the Latin American debt crisis) rather than pure contagion.<sup>37</sup> In other words, it is sometimes hard to empirically distinguish contagion from aggregate shocks or unravelling of imbalances.

Since regular stock price reactions may be relatively remote from strong systemic events, more recent research has focused on particularly large stock price reactions. Extreme-value theory is specifically designed for such "crashes" and permits multivariate extreme

spillover risk among large and complex banks to be estimated.<sup>38</sup> Between the early 1990s and the early 2000s this measure of systemic risk was larger in the United States than in the euro area. Moreover, it has increased substantially in the United States, and only mildly in Europe over the same period. Using a multinomial logit model for less extreme bank stock measures, one finds that cross-border contagion risk among some major European countries was significant and increased over a similar period of time.<sup>39</sup>

- 31 A. Boot and A. Thakor, "Bank regulation, reputation and rents: Theory and policy", in C. Mayer and X. Vives (eds.), *Capital Markets and Financial Intermediation*, Cambridge University Press, 1993.
- 32 R. Merton, "An analytical derivation of the cost of deposit insurance and loan guarantees: An application of modern option pricing theory", *Journal of Banking and Finance*, 1976.
- 33 C. Goodhart and H. Huang, "The lender of last resort", *Journal of Banking and Finance*, 2005.
- 34 E. Farhi and J. Tirole, "Collective moral hazard, maturity mismatch and systemic bailouts", *NBER Working Paper*, No 15138, National Bureau of Economic Research, July 2009.
- 35 J. Aharony and V. Swary, "Contagion effects of bank failures: Evidence from capital markets", *Journal of Business*, 1983; V. Swary, "Stock market reaction to regulatory action in the Continental Illinois Crisis", *Journal of Business*, 1986; J. Peavy and G. Hempel, "The Penn Square bank failure: Effect on commercial bank security returns – a note", *Journal of Banking and Finance*, 1988.
- 36 D. Docking, M. Hirschey and V. Jones, "Information and contagion effects of bank loan-loss reserve announcements", *Journal of Financial Economics*, 1997; and M. Slovin, M. Sushka and J. Polonchek, "An analysis of contagion and competitive effects at commercial banks", *Journal of Financial Economics*, 1999. Similarly mixed results were found in studies using debt rather than stock prices (E. Cooperman, W. Lee and G. Wolfe, "The 1985 Ohio thrift crisis, the FSLIC's solvency, and rate contagion for retail CDs", *Journal of Finance*, 1992).
- 37 M. Smirlock and H. Kaufold, "Bank foreign lending, mandatory disclosure rules, and the reaction of bank stock prices to the Mexican debt crisis", *Journal of Business*, 1987; J. Musumeci and J. Sinkey, "The international debt crisis, investor contagion, and bank security returns in 1987: The Brazilian experience", *Journal of Money, Credit and Banking*, 1990; L. Wall and D. Peterson, "The effect of Continental Illinois' failure on the financial performance of other banks", *Journal of Monetary Economics*, 1990; I. Karafiath, R. Mynatt and K. Smith, "The Brazilian default announcement and the contagion hypothesis", *Journal of Banking and Finance*, 1991; and B. Kho, D. Lee and R. Stulz, "US banks, crises and bailouts: From Mexico to LTCM", *American Economic Review*, 2000.
- 38 P. Hartmann, S. Straetmans and C. de Vries, "Banking system stability: A cross-Atlantic perspective", *NBER Working Paper*, No 11698, National Bureau of Economic Research, October 2005.
- 39 R. Gropp, M. Lo Duca and J. Vesala, "Cross-border contagion risk in Europe", in H. Shin and R. Gropp (eds.), *Banking, Development and Structural Change*, Special Issue of the International Journal of Central Banking, 2009.

Market-based data such as stock prices may be distorted by mispricing. This is one reason why another branch of recent research uses balance-sheet data (in particular interbank exposures and capital) to assess contagion risk with counterfactual simulations. One or several banks are assumed to fail and it is derived how many other banks would fail as a consequence. For some countries, simulated contagion risk is rather limited.<sup>40</sup> For other countries, the results suggest more significant contagion risk.<sup>41</sup> Generally, however, the results are very sensitive to assumptions about how much money is recovered from the assets of failing banks. In a number of cases, evidence is found that cross-border contagion risks in Europe are increasing. Since these simulations ignore endogenously emerging risks and feedback effects, they may, however, also exhibit biases.

Related contagion simulations, using actual payment data or Monte Carlo analysis, have also been undertaken for large-value payment systems. Early research suggested significant systemic risk in net settlement systems.<sup>42</sup> More recent research, however, seems to indicate that much improved risk management in different types of large-value payment systems contains systemic risk.<sup>43</sup> Accordingly, in the present crisis, payment system problems did not play any particular role.

Yet another approach tries to identify bank contagion effects by analysing deposit flows, in particular when there is no deposit insurance. Research on various episodes during the Great Depression in the United States finds that “bad news” about some banks led depositors on some occasions to withdraw their deposits from other banks and on other occasions to deposit their money in other banks (“flight to quality”).<sup>44</sup> Sometimes withdrawals from surviving banks were similar to withdrawals from failing banks, suggesting in some cases contagious behaviour from uninformed depositors, and in other cases not.<sup>45</sup> For a large Indian bank failure in 2001, it has been documented that retail deposit withdrawals at other banks were larger when

those banks had interbank market exposures to the initially failing bank.<sup>46</sup>

Banking crises during the Great Depression were also examined using a duration model, where the survival time of US banks is explained with micro and macro variables.<sup>47</sup> After controlling for these variables, survival times remain related at the regional level, which is consistent with regional contagion effects. Finally, the free banking era in the United States (1837 to 1863) was studied, analysing whether bank failure rates were autocorrelated after controlling for macroeconomic fundamentals. Depending on the crisis considered during this period, clustering of failures was sometimes found and sometimes not found, which is consistent with occasional episodes of bank contagion.<sup>48</sup>

40 See C. Furfine, “Interbank exposures: Quantifying the risk of contagion”, *Journal of Money, Credit and Banking*, 2003, for the United States; H. Elsinger, A. Lehar and M. Summer, “Risk assessment for banking systems”, *Management Science*, 2006, for Austria; H. Degryse and G. Nguyen, “Interbank exposures: An empirical examination of contagion risk in the Belgian banking system”, *International Journal of Central Banking*, 2007, for Belgium; and P. Mistrulli, “Assessing financial contagion in the interbank market: Maximum entropy versus observed interbank linkages”, *Banca d'Italia Temi di Discussione*, No 641, September 2007, for Italy.

41 See C. Upper and A. Worms, “Estimating bilateral exposures in the German interbank market: Is there a danger of contagion?”, *European Economic Review*, 2004, for Germany; and I. van Lelyveld and F. Liedorp, “Interbank contagion in the Dutch banking sector”, *International Journal of Central Banking*, 2006, for the Netherlands.

42 See D. Humphrey, “Payments finality and risk of settlement failure”, in A. Saunders and L. White (eds.), *Technology and the Regulation of Financial Markets: Securities, Futures, and Banking*, Lexington Books, 1986, for US CHIPS.

43 M. Bech, L. Nartop and J. Marquardt, “Systemic risk and the Danish interbank netting system”, *Danmarks National Bank Working Paper*, No 8, 2002; P. Galos and K. Soramäki, “Systemic risk in alternative payment system designs”, *ECB Working Paper Series*, No 508, ECB, July 2005.

44 A. Saunders and B. Wilson, “Contagious bank runs: Evidence from the 1929-33 period”, *Journal of Financial Intermediation*, 1996.

45 C. Calomiris and J. Mason, “Fundamentals, panics and bank distress during the Depression”, *American Economic Review*, 2003; and C. Calomiris and J. Mason, “Contagion and bank failures during the Great Depression: The June 1932 Chicago bank panic”, *American Economic Review*, 1997.

46 R. Iyer and J. Peydró, “Interbank contagion at work: Evidence from a natural experiment”, *Review of Financial Studies*, forthcoming.

47 C. Calomiris and J. Mason (2003) op. cit.

48 I. Hasan and G. Dwyer, “Bank runs in the free banking period”, *Journal of Money, Credit and Banking*, 1994.

## MACROECONOMIC SHOCKS

The role of economic downturns as a causal factor for systemic banking crises is well documented in the research literature. For example, most banking panics in the United States in the second half of the 19th and in the early 20th century could have been predicted with a standard business cycle forecasting model.<sup>49</sup> Also more recent studies of systemic banking crises or bank distress that introduce macroeconomic fundamentals (such as GDP growth, real interest rates or inflation) as explanatory variables typically find them to be significant, irrespective of the episodes or countries considered.<sup>50</sup>

Extreme-value theory can be used to derive so-called tail-betas for banks. They reflect extreme systematic risk, measuring how extreme crashes in the market factor influence the likelihood of extreme crashes in individual bank stocks. Recent research suggests that such extreme systematic risk is a relevant form of systemic risk, which increased along similar lines in the euro area and the United States between the early 1990s and early 2000s.<sup>51</sup>

## UNWINDING OF IMBALANCES

How the pro-cyclicality of financial systems contributes to the occurrence of systemic crises has not been tested econometrically to any significant extent. An exception is a large cross-country panel study of lending booms between 1960 and 1996, which finds that the probability of banking crises right after lending boom periods is higher than during tranquil periods.<sup>52</sup>

One important element of pro-cyclicality is how lending standards evolve over the cycle. Recent research suggests that lending standards in US mortgage markets declined in the run-up to the present crisis. Moreover, lending standards declined by more in regions with larger mortgage credit booms, larger housing price booms and higher mortgage securitisation rates.<sup>53</sup>

The role that monetary policy can inadvertently play in pro-cyclicality through its impact on financial risk-taking has been documented in recent empirical research. While reductions

in interest rates first have a positive effect on the net present value of loans, as loan rates decrease and remain low for a longer period of time banks tend to move into riskier loans to re-establish profitability.<sup>54</sup> The risks that build up materialise particularly strongly when rates rise fast thereafter.

Finally, although financial regulation is designed to stabilise financial systems, it may still contain pro-cyclical components. A variety of recent simulation studies, for example, have found that moving from the Basel I to the Basel II capital adequacy rules could enhance the contribution of regulatory capital to pro-cyclicality.<sup>55</sup>

49 G. Gorton, "Banking panics and business cycles", *Oxford Economic Papers*, 1988.

50 A. Demirgüç-Kunt and E. Detragiache, "The determinants of banking crises in developing and developed countries", *IMF Staff Papers*, 1998; and B. Gonzalez-Hermosillo, "Determinants of ex-ante banking system distress: A macro-micro exploration of some recent episodes", *IMF Working Paper*, No WP/99/33, 1999.

51 P. Hartmann et al. (2005), op. cit.; S. Straetmans, W. Verschoor and C. Wolff, "Extreme US stock market fluctuations in the wake of 9/11", *Journal of Applied Econometrics*, 2008. European banks with greater non-interest generating activities tend to be more vulnerable to this extreme systematic risk (O. de Jonghe, "Back to the basics in banking? A micro-analysis of banking system stability", *Journal of Financial Intermediation*, forthcoming).

52 P.-O. Gourinchas, R. Valdes and O. Landerretche, "Lending booms: Latin America and the world", *Economia*, 2001. W. Hunter, G. Kaufman and M. Pomerleano (eds.), *Asset Price Bubbles: The Implications for Monetary, Regulatory, and International Policies*, MIT Press, 2003, contains many articles discussing theoretical and empirical analyses, historical episodes and policy issues. Special Feature D in this Review discusses tools to detect asset price misalignments.

53 G. Dell'Ariccia, D. Igan and L. Laeven, "Credit booms and lending standards: Evidence from the subprime mortgage market", *European Banking Center Discussion Paper*, No 14S, January 2009; and A. Mian and A. Sufi, "The consequences of mortgage credit expansion: Evidence from the 2007 mortgage default crisis", *Quarterly Journal of Economics*, forthcoming.

54 G. Jimenez, S. Ongena, J. Peydró and J. Saurina, "Hazardous times for monetary policy: What do twenty-three million bank loans say about the effects of monetary policy on credit risk-taking?", *CEPR Discussion Paper*, No 6514, 2007; V. Ioannidou, S. Ongena and J. Peydró, "Monetary policy, risk-taking and pricing: Evidence from a natural experiment", *CentER Discussion Paper Series*, No 31S, 2009; and Y. Altunbas, L. Gambacorta and D. Marques-Ibanez, "An econometric assessment of the risk-taking channel", paper presented at the BIS/ECB conference on "Monetary Policy and Financial Stability", Basel, September 2009 (available at: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1459627](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1459627)).

55 Special Feature C, entitled "The pro-cyclical effects of Basel II: A selected review of the literature", in this FSR discusses pro-cyclical effects of the Basel II capital standards and provides a selective overview of the literature.

In fact, there seems to be a trade-off between micro efficiency and macro stability. The more granular the regulatory risk weights, the more pronounced the pro-cyclical effect of regulation.

### CONCLUDING REMARKS

The need to strengthen macro-prudential financial supervision in Europe and worldwide requires a deep understanding of systemic risk. Given the high mobility of financial activities in present times, the analysis of systemic risk should cover all components of financial systems and consider exogenous and endogenous sources of risk, including feedback effects and non-linearities. Moreover, the effects of financial innovation on the structure and risks of financial systems need to be incorporated in relevant models. The analysis also needs to include the two-sided relationship between financial systems and the economy at large.

Academic research has made good progress in enhancing the understanding of systemic risk over the last two decades both from a theoretical and from an empirical perspective. For example, important elements of the present crisis have been analysed in the literature, some before the crisis broke out. But significant open issues remain. For example, it remains a challenge to clearly distinguish different forms of systemic risk in empirical research. Further research efforts could also be particularly valuable in the following areas. First, researchers need to develop broad modelling frameworks that cover the most important aspects of systemic risk and are widely accepted in the profession. For example, existing macroeconomic models do not at present feature relevant aspects of financial instability.<sup>56</sup> Second, academic research should pay further attention to the sources of the build-up of widespread imbalances and their endogenous unravelling. For example, the benefits and costs of major financial innovations need to be better understood and documented. Third, the systemic importance of some non-bank financial intermediaries, and of different bank business models, needs to be

studied.<sup>57</sup> Fourth, the benefits and costs of over-the-counter versus on-exchange trading, as well as the role of central clearing counterparties, particularly for derivatives, deserve greater attention in macro-prudential research.

Research advances in these directions, in particular when combined with market experience and current policy analysis, will be of great help in further developing macro-prudential supervision and in supporting the bodies that are currently being set up in Europe and elsewhere.<sup>58</sup>

<sup>56</sup> General equilibrium models with default are an important step in the right direction (see C. Goodhart, P. Sunirand and D. Tsomocos, "A risk model for banks", *Annals of Finance*, 2005; and C. Goodhart, P. Sunirand and D. Tsomocos, "A model of financial fragility", *Economic Theory*, 2006).

<sup>57</sup> Special Feature E, entitled "The importance of insurance companies for financial stability", in this Review discusses the importance of insurance companies for financial stability.

<sup>58</sup> Special Feature A, entitled "Towards the European Systemic Risk Board", in this Review describes the establishment of the European Systemic Risk Board.

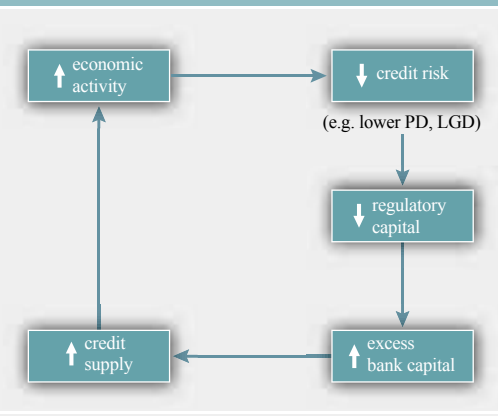
## C IS BASEL II PRO-CYCLICAL? A SELECTED REVIEW OF THE LITERATURE

*The purpose of this special feature is to review the ongoing academic debate on the potential pro-cyclical effects of bank capital regulation under Basel II, as well as the initiatives undertaken and new proposals put forward to reduce such potential effects. The main conclusions that seem to emerge are fourfold. First, based on simulation exercises, Basel II may increase the volatility of bank capital requirements over the business cycle. Second, available empirical microeconomic evidence on the relationship between bank capital and the credit supply suggests that bank lending may become more cyclical with Basel II, but mostly as far as undercapitalised and illiquid banks are concerned. Hence, at the aggregate level, the extent to which Basel II may amplify the business cycle depends on the degree of undercapitalisation and access to liquidity of the banking sector as a whole. Third, given the data limitation and identification problems, it is still too early to precisely assess whether or not Basel II has affected the business cycle in the countries where it is already implemented. Fourth, while there seems to be a view among academics that Basel II, as it currently exists, may not be adequately designed to cope with all sources of risks in the financial system, financial regulatory authorities have recently been discussing a comprehensive set of measures to enhance the Basel II framework with the aim to contain leverage and promote the build-up of counter-cyclical capital buffers in the banking sector.*

### INTRODUCTION

In the discussion on the impact of the revised regulatory framework for capital adequacy (Basel II), the potential for an amplified pro-cyclicality in the financial system and the economy as a whole has been a major source of concern. In economic downturns, credit risk, measured by the borrower's probability of default (PD) and loss given default (LGD), would be high, as would capital requirements (now tied more closely to risk than under a

#### The pro-cyclical effects of risk-sensitive regulatory capital



“flat-rate” capital requirements framework such as Basel I).<sup>1</sup> Banks would therefore face higher capital needs, at a time when (i) write-offs on defaulted loans reduce their profits and impair their capacity to build up reserves and (ii) raising capital is expensive due to both the general depreciation of assets and the increasing aggregate demand for capital. The combination of higher capital requirements and the difficulty of raising new capital when it is most needed could induce banks to reduce credit to firms and households, and eventually amplify the downturn. Conversely, during an economic upturn, banks holding excess capital would face lower capital needs (for the same risk exposure), expand credit further and potentially fuel a credit-led boom (see the figure above).

Under the assumption that banks play a specific role in the economy and that the bank credit supply affects economic activity, risk-based capital requirements would work to amplify the business cycle if two conditions are met. First, capital requirements would need to increase

<sup>1</sup> It should be noted, however, that, according to Basel II, banks should apply “through-the-cycle” PDs and are required to operate with “downturn LGDs”, which should be less sensitive to GDP fluctuations than the real LGDs. In addition, only banks that apply the advanced internal-rating-based (IRB) approach use models to compute the LDGs. In the foundation IRB approach, the LGDs are exogenously imposed by the supervisor (with the exception of retail exposures), and should therefore be stickier than in the advanced IRB approach.

in economic downturns and decline in upturns (the so-called “pro-cyclicality” of regulatory capital). Second, credit supply would need to be inversely related to capital requirements (the so-called “bank capital channel”).

### **SIMULATION EXERCISES SUGGEST CAPITAL REQUIREMENTS MAY BE MORE CYCLICAL UNDER BASEL II**

Based on simulation exercises, there is a general consensus in the academic literature that capital requirements under the new capital framework are likely to be more cyclical than under Basel I. Generally, the integration of the PDs and LGDs into the calculation of capital requirements is considered to be the main driver of cyclicity. Allen and Saunders<sup>2</sup> document, based on US data, that increases in interest rates and decreases in asset prices both work to raise the corporate sector PDs and LGDs, which enter the calculation of capital requirements. For Sweden, Jacobson et al.<sup>3</sup> find that fluctuations in corporate PDs are not only affected by financial factors, but also by the real side of the economy, in particular by GDP. As regards the relative impact of these risk parameters, PDs are usually considered to be the main contributors to the cyclicity of the framework.

Due to the lack of data, the literature has assessed the cyclicity of capital requirements under Basel II on the basis of simulations. Work by Kashyap and Stein<sup>4</sup> and Gordy and Howells<sup>5</sup> make clear that the extent of cyclicity in capital requirements depends on the assumptions that underlie these simulations and, in particular, on how the loan portfolio varies with macroeconomic conditions (what they call the portfolio “re-investment rule”). In all simulations, the re-investment rule depends exogenously on the bank’s macroeconomic environment, but two different approaches were chosen. Under one approach (see Kashyap and Stein<sup>4</sup>), the composition of banks’ loan portfolios remains “passive” over time, in the sense that it is fixed at the beginning of the simulation. In the other approach (see Gordy and Howells<sup>5</sup>), banks’ loan portfolios are

assumed to be “cyclical” in order to mimic the sensitivity of banks’ portfolios to the business cycle that one observed under Basel I. This latter approach makes it possible to identify the marginal increment to pro-cyclicality associated with shifting from Basel I to Basel II. In particular, banks tend to tighten their lending standards during downturns, as described by Gertler and Gilchrist<sup>6</sup>, and Bassett and Zakrajsek<sup>7</sup>, who show that the average quality of the new loans usually decreases at the start of a recession. Such technical assumptions are found to have a first-order effect on the results. Overall, required capital is expected to be twice as volatile with a passive re-investment rule as with a cyclical rule. In the latter case, banks rebalance their portfolio towards higher-quality borrowers in downturns, so that their credit risk diminishes (relative to a passive portfolio), which limits the initial rise in required capital. At the limit, Rösch<sup>8</sup> shows that the capital required on non-defaulting loans may even decrease in a downturn, if banks rebalance their portfolio aggressively enough. In addition to the methodology employed, the results of the simulations also depend on other factors, such as the country or the sample period. As a consequence, the literature therefore reports a broad range of estimates. The general conclusion is that capital requirements should be more cyclical under Basel II than under Basel I. For example, Catarineu-Rabell et al.<sup>9</sup> find

- 2 L. Allen and A. Saunders, “Incorporating Systemic Influences into Risk Measurements: A Survey of the Literature”, *Journal of Financial Services Research*, Vol. 26, No 2, October 2004.
- 3 T. Jacobson, R. Kindell, J. Lindé and K. Roszbach, “Firm default and aggregate fluctuations”, *Sveriges Riksbank Working Paper Series*, No 226, September 2008.
- 4 A. N. Kashyap and J. Stein, “Cyclical implications of Basel II capital standards”, *Economic Perspectives*, Federal Reserve Bank of Chicago, Vol. 28, 2004, pp. 18-31.
- 5 M. Gordy and B. Howells, “Procyclicality in Basel II: Can we treat the disease without killing the patient?”, *Journal of Financial Intermediation* Vol. 15(3), 2006, pp. 395-417.
- 6 M. Gertler and S. Gilchrist, “Monetary policy, business cycle, and the behaviour of small manufacturing firms”, *Quarterly Journal of Economics*, Vol. CIX, 1994, pp. 309-340.
- 7 W. Bassett and E. Zakrajsek, “Recent developments in business lending”, *Federal Reserve Bulletin*, December 2003, pp. 477-492.
- 8 D. Rosch, “Mitigating procyclicality in Basel II: a value at risk based remedy”, University of Regensburg, mimeo, 2002.
- 9 E. Catarineu-Rabell, P. Jackson and D. Tsomocos, “Procyclicality and the new Basel Accord – banks’ choice of loan rating system”, *Economic Theory*, No 26, 2005.

that Basel II would have increased banks' capital charges by about 15% in the United States during the credit crunch of the early 1990s, while the numbers given by Kashyap and Stein are somewhat higher for the period 1998-2002, with 30-45% of extra capital charges, on average, during the downturn.

### EVIDENCE ON THE EFFECT OF REGULATORY CAPITAL ON CREDIT SUPPLY

The cyclicity of capital requirements is not a sufficient condition for Basel II to have pro-cyclical effects. Indeed, banks tend to hold a significant amount of capital above regulatory requirements (so-called "capital buffers") in practice, which may insulate their credit supply from changes in capital requirements. The reasons for holding capital buffers are manifold, e.g. for efficiency reasons, as a signal to the market, or to avoid the costs associated with having to issue fresh equity at short notice in case the Tier 1 capital ratio unexpectedly falls below the regulatory minimum. Large capital buffers have been observed in the United States and in EU countries.<sup>10</sup> Among others, Flannery and Rangan<sup>11</sup> document a dramatic capital build-up between 1986 and 2001 in the United States. For their sample of US bank holding companies, they report a rise of the average market equity ratio to 17.5% in 2001, from a low of 5.8% at the end of the 1990-91 recession. Book-value capital ratios also rose sharply during the 1990s, with bank holding companies holding, on average, 75% more book capital than the regulatory minimum capital in 2001. Similar numbers are found in Europe, where Tier 1 ratios for large and complex banking groups were almost twice as high as required (i.e. about 8%) at the end of 2006, and have remained significantly above regulatory minima even during the recent financial crisis. Are such buffers large enough? Most empirical studies have tried to answer this question indirectly by assessing the impact of bank capital positions on bank lending.<sup>12</sup> Overall, the evidence on the effect of capital positions on bank lending is somewhat mixed. On the one hand, Gropp and Heider<sup>13</sup> show that EU banks' leverage can be

fully explained by the same determinants as for non-financial firms (namely the market-to-book ratio, profits, size or risk) and is independent of the banking sector's regulatory pressures. On the other hand, Hancock et al.<sup>14</sup> find evidence that bank capital does affect lending in the United States, and that credit supply is less sensitive to GDP shocks for well-capitalised banks than for banks with low capital positions. In addition, they estimate the responses of lending to capital shocks directly, and find that capital shocks caused banks to reduce lending more quickly in the 1990s than in the 1980s. Kishan and Opiela<sup>15</sup> studied, also for the United States, the relationship between bank capitalisation and monetary policy by looking at lending by banks broken down into different asset size and capital leverage ratio groups. They found that undercapitalised banks have the largest response of loans to monetary policy shocks, but the smallest response of time deposits, indicating that small, poorly capitalised banks are unable to raise alternative funds to sustain lending levels when monetary policy tightens. The most recent studies on European countries corroborate these findings. Based on a comprehensive micro-dataset from Spain that contains monthly information on firms' loan applications, as well as detailed balance-sheet information of both firms and banks, Jiménez et al.<sup>16</sup> provided compelling evidence that lower GDP growth or higher short-term interest rates decrease the probability that a loan application results in a loan being

10 Note that in most studies the capital buffer is approximated by the Tier 1 ratio or by the capital-to-asset ratio.

11 M. Flannery and K. Rangan, "What caused the bank capital build-up of the 1990s?", *Review of Finance*, Vol. 12, 2008, pp. 391-429.

12 The idea behind these studies is that bank capital requirements may have an effect on lending only if the bank capital position has an effect in the first place.

13 F. Heider and R. Gropp, "The determinants of capital structure: some evidence from banks", *ZEW Discussion Paper*, No 08-15, 2008.

14 D. Hancock, A. Laing and J. Wilcox, "Bank Capital Shocks: Dynamic Effects on Securities, Loans, and Capital", *Journal of Banking and Finance*, Vol. 19, June 1995, pp. 661-67.

15 R. Kishan and T. Opiela, "Bank Size, Bank Capital and the Bank Lending Channel", *Journal of Money, Credit and Banking*, Vol. 32, 2000, pp. 121-141.

16 G. Jiménez, S. Ongena, J.-L. Peydró and J. Saurina, "Hazardous times for monetary policy: what do twenty-three million bank loans say about the effects of monetary policy on credit risk-taking?", *ECB Working Paper Series*, ECB, forthcoming.

granted, especially by banks with low capital or liquidity. All in all, micro-econometric evidence suggests that Basel II may increase the sensitivity of bank lending to the business cycle, but only where undercapitalised and illiquid banks are concerned. Ultimately, the cyclical impact of Basel II at the aggregate level will therefore depend on the degree of undercapitalisation of the banking sector as a whole.

### BANKS' OPTIMAL RESPONSE TO BASEL II REGULATION

The empirical studies on the effect of capital requirements on bank lending were conducted over a sample period when Basel II had not yet been implemented. The conclusions of these studies will remain valid under Basel II only if the changes in regulation are not accompanied by any change in banks' lending behaviour. As Repullo and Suarez<sup>17</sup> put it, however, "a misconception is to accept that the cyclical behaviour of capital buffers under Basel II can be somehow predicted from the empirical behaviour of capital buffers in the Basel I era. If buffers are endogenously affected by the prevailing bank capital regulation (even if they appear not to "bind"), reduced-form extrapolations from the Basel I world to the Basel II world do not resist the Lucas critique." Will the relationship between bank capital requirements and credit supply remain the same under Basel II as under Basel I? A few theoretical analyses have tried to answer this question. Their common conclusion is that the elasticity of lending to regulatory capital should be lower under Basel II, which should work to mitigate the pro-cyclical effects. The theory can be split into two sets of papers, which look at the question of pro-cyclicality from two different angles. The first strand of the theory focuses on the dynamics of bank capital buffers, and assumes only one class of credit risk in banks' loan portfolio. Heid<sup>18</sup>, Zhu<sup>19</sup> and Repullo and Suarez<sup>17</sup> show that under Basel II banks are likely to manage their capital more dynamically, in the sense that they will engage in regulatory capital arbitrage across time. Recognising that future adverse shocks

to their earnings may impair their capacity to lend in the future, banks will, as a precaution, accumulate capital in excess of regulatory capital in upturns. In these models, banks hold a counter-cyclical capital buffer, which plays a crucial role in mitigating the volatility in capital requirements. Heid<sup>18</sup> shows that the effects of Basel II on the overall economy will be moderate, despite the fact that capital charges may vary significantly over time. Repullo and Suarez<sup>17</sup> reach the same conclusion, although they note that the higher buffers maintained in expansions still remain insufficient to prevent a significant contraction in the supply of credit upon the arrival of a recession.

In the second strand of the theoretical literature, banks do not build up capital buffers over time, but rather make regulatory capital arbitrages across the various classes of credit risk present in their loan portfolios. Jokivuolle et al.<sup>20</sup> and Boissay and Kok Sørensen<sup>21</sup> present models based on the textbook over-investment model of De Mezza and Webb<sup>22</sup> with heterogeneous borrowers and asymmetries of information on the credit market. Under Basel I, capital requirements increase the cost of lending to all borrowers, irrespective of their quality, which gives rise to the standard cross-subsidisation effect: high-quality borrowers underinvest, while low-quality borrowers overinvest. By contrast, Basel II reduces cross-subsidisation by giving banks incentives to identify the high-quality borrowers, since the (shadow) cost of capital is lower for safe than for risky loans. In addition, under Basel II capital requirements on high-quality loans are, by construction, not

17 R. Repullo and J. Suarez, "The procyclical effects of Basel II", *CEMFI Working Paper*, No 0809, 2008, p. 35.

18 F. Heid, "The cyclical effects of the Basel II Capital Requirements", *Journal of Banking and Finance*, Vol. 31, 2007, pp. 3885-3900.

19 H. Zhu, "Capital regulation and banks' financial decisions", *International Journal of Central Banking*, Vol. 4(1), 2008, pp. 165-212.

20 E. Jokivuolle, I. Kiema and T. Vesala, "Credit allocation, capital requirements and procyclicality", *Bank of Finland Discussion Paper*, No 23, 2009.

21 F. Boissay and C. Kok Sørensen, "The stabilizing effects of risk-sensitive bank capital", *ECB Working Paper Series*, ECB, forthcoming.

22 D. De Mezza and D. Webb, "Too much investment: a problem of asymmetric information", *Quarterly Journal of Economics*, Vol. 102, 1987, pp. 281-292.

only lower, but also more cyclical than those on low-quality loans (see e.g. Gordy and Howells<sup>23</sup>). This triggers regulatory arbitrage between low and high-quality loans over the business cycle, as it then becomes optimal for banks to raise their lending standards in upturns in order to reap all benefits from relatively lower capital requirements on high-quality loans. This tightening in lending standards in good times crowds the riskiest borrowers out of the credit market, reduces overinvestment and limits excess lending when it is needed the most, i.e. when the economy is overheating. Overall, the theoretical literature agrees that the elasticity of aggregate lending to regulatory capital is likely to be lower under Basel II, and that this may partially offset the effects of pro-cyclical capital requirements. These predictions contrast with the observation that banks used to tighten lending standards under Basel I during recessions, and therefore emphasise the potential relevance of the Lucas critique.

A fair conclusion that stems from the academic literature is that Basel II probably has a benign effect on the business cycle in normal times, when the banking system is generally well capitalised. However, the recent financial crisis has refocused the debate on the potential negative effects of risk-sensitive capital requirements in bad times. Indeed, from a social welfare perspective, financial institutions have been found to have overexposed themselves not only to credit and operational risks, but also to more systemic risks, such as market liquidity and funding liquidity risks. In the first place, the Basel II framework is not designed to cope with such risks. In a panic, no reasonable capital buffer can restore confidence, and additional capital requirements may even work to amplify the deleveraging process.

The Basel II capital framework has been transposed into EU law by the implementation of the Capital Requirements Directive (CRD), which came into force in EU countries in January 2008. Did the CRD have a pro-cyclical effect in the EU during the recent financial crisis? A preliminary assessment recently

carried out by the European Central Bank, in cooperation with the Banking Supervision Committee (BSC) and the Committee of European Banking Supervisors (CEBS), on the basis of 2008 data points to rather modest effects. The main conclusion of this work is that it is still too early to precisely identify and assess the cyclical effects of the capital requirements, owing to the recent implementation of the CRD and the concomitance of the implementation phase with massive policy interventions in the banking sector.

#### RECENT PROPOSALS TO REDUCE THE POTENTIAL PRO-CYCLICALITY OF BANKING REGULATION

As shown in academic literature described above, the concerns about the cyclical effects of capital regulation are not new. The first proposals to limit cyclical effects had already been made as the Basel II framework was being developed, and the new framework already recommends the use of through-the-cycle (TTC) ratings (as opposed to point-in-time (PIT) ratings) as a way to reduce volatility. Typically, TTC ratings do not change rapidly in response to fluctuations in the macroeconomic conditions, and are thus less influenced by the business cycle. The use of TTC ratings is therefore a way to smooth the potential volatility of the PDs, and ultimately the capital requirements. For this reason, Catariueu-Rabell et al.<sup>24</sup> recommend that regulators encourage banks to adopt TTC ratings, provided that the data used to calculate the PDs cover a period sufficiently long to include at least one business cycle. Gordy and Howells, by contrast, see a great cost to the use of TTC ratings. Such ratings, they argue, would by construction disconnect regulatory capital from economic capital, and therefore make the information disclosed by banks less transparent. The recent financial crisis also shows the limits of using TTC ratings. For banks to maintain credibility, it is indeed crucial to have strong capital positions during the downturns. Hence, even banks that use TTC ratings (and therefore face stable capital

<sup>23</sup> Gordy and Howells (2006), op. cit.

<sup>24</sup> Catariueu-Rabell (2005), op. cit.

requirements) may be forced to raise capital in order to align their capital positions with banks using PIT ratings. Given these caveats, it was proposed to smooth the output, rather than the input, of the Basel II formula (so-called “counter-cyclical indexing”). Perhaps the best justification for this was given by Kashyap and Stein<sup>25</sup>. For these authors, capital requirements should reflect the trade-off between the private cost of capital (underinvestment) and the social cost of bank failures. They ask the following question: what capital requirements would a regulator who cares not only about bank default risk, but also about the efficiency of bank lending, choose? They show the optimum has two characteristics. First, regulatory capital should be positively related to individual risk at any point in time (i.e. in the “cross-sectional” dimension): relatively more capital should be required on relatively riskier loans, in order to force banks to internalise the social cost of credit risk-taking. Second, regulatory capital should be negatively related to aggregate risk (i.e. in the “time series” dimension): less capital should generally be required when capital is scarce (typically in recession) in order to support bank lending. In other words, when underinvestment is severe, the regulator should be willing to tolerate default risk. This can be achieved by applying a counter-cyclical multiplier to the capital required under Basel II, keeping the required capital ratio constant (at 4%) and the risk weights unchanged. This multiplier would be indexed to the business cycle, i.e. reduced by the regulator during a recession to offset the effect of higher PDs on required capital. Gordy and Howells<sup>26</sup> recommend that national regulators pre-commit to a simple and transparent indexation rule, in order to (i) prevent potential discretionary, non-cooperative regulatory changes, while (ii) allowing countries with desynchronised business cycles to apply different multipliers. Counter-cyclical indexing raises the question as to which variable(s) should the multiplier be indexed to. One possibility is to link the multiplier to individual banks’ characteristics. For example, Goodhart and Persaud<sup>27</sup> propose to condition capital requirements on the growth of the value of bank assets (bank by bank), with the

purpose of penalising banks with excessive lending and forcing these banks to build up reserves during booms. In the same vein, Brunnermeier et al.<sup>28</sup> suggest (inter alia) that maturity mismatches are penalised. The idea is to require more capital not only against the risk of assets, but also against the risk of funding these assets, which includes the leverage and maturity mismatch. For example, a bank that finances its assets with term deposits would have to set aside a lower amount of capital than a bank that finances similar assets with overnight borrowing from the money markets. The proposals to link the bank capital multiplier to individual bank data have generally received limited attention. One reason is the complexity and difficulty related to their implementation. Another reason is their limited impact on capital requirements at the aggregate level. Repullo et al.<sup>29</sup> show that bank-specific multipliers would actually not smooth capital requirements as much as multipliers based on macroeconomic variables. These authors also simulate and compare the smoothing effects of various multipliers indexed to macroeconomic variables. They find that the multiplier that smoothes capital requirements the most is the multiplier based on GDP growth, and that the credit growth multiplier and the stock market return multiplier are both sub-optimal.

The above proposals involve amending Basel II. Another set of proposals has been put forward, based on the idea that bank capital alone does not suffice to cope with funding and market liquidity problems. These proposals consist in complementing the existing regulatory framework by capital insurance or liquidity insurance mechanisms. Kashyap et al.<sup>30</sup>,

25 Kashyap and Stein (2004), op. cit.

26 Gordy and Howells (2006), op. cit.

27 C. Goodhart and A. Persaud, “A party pooper’s guide to financial stability”, *Financial Times*, 5 June 2008.

28 M. Brunnermeier, A. Crockett, C. Goodhart, A. Persaud and H. Shin, “The Fundamental Principles of Financial Regulation”, *ICMB-CEPR Geneva Reports on the World Economy*, 11, 2009.

29 R. Repullo, J. Saurina, and C. Trucharte, “Mitigating the procyclicality of Basel II”, *Macroeconomic Stability and Financial Regulation: Key Issues for the G20*, Centre for Economic Policy Research (CEPR), March 2009.

30 A. Kashyap, J. Stein and R. Rajan, “Rethinking capital regulation”, Jackson Hole conference paper, 2008.

in particular, are relatively pessimistic about policy-makers' ability to prevent crises and therefore about the effectiveness of influencing ex ante incentives, even with the various amendments proposed above. Their proposal is aimed at limiting the costs of crises to be borne by the public sector, i.e. taxpayers, and consists in establishing a private insurance scheme funded by investors with an appetite for stable cash flows with a small probability of a serious loss (e.g. pension or sovereign wealth funds). Banks subject to capital regulation would be given the option to purchase this insurance, but it would not be mandatory. Opting into the insurance scheme should be rewarded by lowering a bank's capital ratio. Perotti and Suarez<sup>31</sup> go beyond this, and what they propose can be viewed as a synthesis of the Brunnermeier et al.<sup>32</sup> and the Kashyap et al.<sup>33</sup> proposals. For them, liquidity assistance to help banks cope with aggregate liquidity shocks is a good thing in principle, but has little value if banks are not given the right incentives to reduce the probability of such shocks in the first place. Their proposal aims both at giving banks the right incentives ex ante and at improving the resilience of the financial system to shocks ex post. They propose to complement Basel II regulation by establishing a mandatory liquidity insurance arrangement, whereby each bank has to pay to the supervisor a liquidity charge. This liquidity charge should be proportional to short-term wholesale liabilities, weighted by the bank's maturity mismatch. It would therefore increase with the maturity mismatch of the bank. This proposal is based on the idea that banks that finance long-term loans by rolling over short-term debt may impose a negative externality on the whole financial system. In the case of an (even benign) aggregate liquidity shortage in the economy, for example, such banks would typically be the first to deleverage and liquidate assets, which may trigger a fall in asset prices and expose other banks to refinancing problems (e.g. through margin calls). The liquidity charge would make banks internalise the potential negative externalities they may generate, and align their private incentives with the general interest.

For credibility reasons, the charge should be levied by a public entity (say the supervisor) and, to avoid the standard moral hazard issues, the insurance should be paid out upon aggregate liquidity runs only (and not based on individual banks). In this case, the supervisor would use the insurance fund to quickly resolve the initial liquidity shortage. Perotti and Suarez recommend the establishment of this insurance fund at the international level to address commitment problems and the potential non-cooperative use of the insurance fund.

#### RECENT AND ONGOING INITIATIVES TO REDUCE THE POTENTIAL PRO-CYCICALITY OF BANKING REGULATION

The financial crisis has shown the need for enhanced financial regulation. The Financial Stability Board (FSB) recently recommended a strengthening of the regulatory capital framework (Financial Stability Forum<sup>34</sup>) in order to increase the quality and level of capital in the banking system during economic upturns that could be drawn down during periods of economic and financial stress, and endorsed the work done by the Basel Committee on Banking Supervision (BCBS) to enhance the current capital regulatory framework. While the Basel II framework already includes elements which may dampen the cyclicalities of capital requirements, for example recommending the use of TTC ratings or downturn PDs in the calculation of required capital, the BCBS has recently been discussing a more global package of measures not only to reduce the cyclicalities of capital requirements but also, more generally, to improve the resilience of the banking sector to financial distress.<sup>35</sup> In line with the FSB assessment, these measures aim

31 E. Perotti and J. Suarez, "Liquidity insurance for systemic crises", *CEPR Policy Insight*, 31, 2009.

32 Brunnermeier et al. (2009), op. cit.

33 Kashyap et al. (2008), op. cit.

34 Financial Stability Forum, "Report of the Financial Stability Forum on addressing pro-cyclicality in the financial system", April 2009.

35 See Basel Committee on Banking Supervision, "Enhancement to the Basel II framework", Bank for International Settlements, July 2009.

at reducing the potential pro-cyclical effects of capital regulation by (i) giving banks incentives to accumulate counter-cyclical buffers, (ii) limiting bank leverage, and (iii) promoting a more forward-looking loan loss-provisioning behaviour by banks. Building upon the lessons learned from the financial crisis, the BCBS also reviewed the rules governing trading book capital by enhancing the three pillars of the Basel II framework in this respect. In particular, it introduced higher risk weights on asset-backed securities in order to better reflect the risk inherent in these complex products (Pillar I), issued supplemental guidance for the supervisory process to address the flaws in risk management practices revealed by the financial crisis (Pillar II) and strengthened the disclosure requirements for securitisation, off-balance-sheet exposures, and trading activities (Pillar III).

comprehensive package of measures to enhance the Basel II capital framework, including the introduction of counter-cyclical capital buffers, as well as additional measures which aim at limiting leverage in the banking sector.

#### CONCLUDING REMARKS

Probably one of the main conclusions that emerges from the academic debate on the pro-cyclical effects of Basel II, as currently defined, is that risk-sensitive capital requirements should have pro-cyclical effects mostly on undercapitalised banks. Hence, at the aggregate level, the extent of pro-cyclical effects of Basel II may depend on the degree of undercapitalisation of the banking sector as a whole. Thus, while the cyclical effects are probably benign in normal times when the banking system is generally well-capitalised, they might be more significant in bad times. In fact, there is a consensus among academics that Basel II may not be adequately designed and sufficient to cope with deep, systemic financial crises, and a number of proposals to improve or complement the Basel II framework have received attention. One of these proposals consists in amending the Basel II regulation, as currently defined, towards applying a counter-cyclical multiplier on required capital, so that banks do not need to build up as much capital when it is scarce as when it is abundant. In this context, the BCBS is working on a

## D TOOLS TO DETECT ASSET PRICE MISALIGNMENTS<sup>1</sup>

*Asset markets seem to have been playing an increasingly important role in many economies, and policy-makers have become far more aware that the sizeable changes and, sometimes, significant corrections of asset prices may lead to financial and, ultimately, macroeconomic instability. Not least against the background of the recent financial turmoil, many international institutions and academics have focussed on the development of early warning indicator models for asset price misalignments.*

*After providing a short review of the literature and the methodologies used in this context, this special feature presents some empirical results related to defining and predicting asset price misalignments. An asset price composite indicator is constructed which incorporates developments in both the stock price and house price markets, and a method for identifying asset price busts is presented. An empirical analysis carried out on the basis of a panel probit-type approach finds that credit aggregates, nominal long-term interest rates and the investment-to-GDP ratio, together with developments in either house or stock prices, are the best indicators that help to predict busts up to eight quarters ahead.*

### INTRODUCTION

Over the past decade, asset markets seem to have played an increasingly important role in many economies, and policy-makers have become increasingly more aware that the sizeable changes and, sometimes, significant corrections of asset prices may lead to financial and, ultimately, macroeconomic instability. For example, the bursting of an asset price bubble (i.e. a bust) could lead to a sharp drop in aggregate demand, and thus to deflationary risks, both via direct wealth effects and, if the stability of the financial sector is affected, via a credit crunch. A zero lower bound on nominal interest rates could then make it more difficult for the central bank to maintain price stability.

Against this background, movements in equity values and prices of real assets – such as residential and commercial property – have also been in the focus of interest of central banks insofar as they pose many challenges. On the one hand, it is clearly important for central banks to be able to understand the underlying sources of asset price changes. This also implies the necessity of distinguishing whether asset price changes are driven by changes in current and expected future “fundamentals” (e.g. an improved productivity which would justify an increase in equity prices) or by deviations from those fundamentals (e.g. over-optimistic expectations of future earnings). The latter case is generally referred to as an “asset price bubble”, the subsequent bursting of which can be destabilising for the financial system and the real economy. On the other hand, at a more practical level, it is also recognised that distinguishing fundamentals from non-fundamental sources of asset price movements in real time is an extremely difficult task, as estimates of the equilibrium value of asset prices are usually surrounded by a high degree of uncertainty.

History has shown that boom-bust cycles in asset prices can harm the entire economy. Whenever the building-up of a bubble is associated with excess credit and liquidity creation – which is very often the case – asset price crashes can become the cause of deflationary trends, as observed in some economies in the past.<sup>2</sup> It is also important to stress that monetary stability and financial stability are all closely interlinked, insofar as a monetary policy regime that guarantees aggregate price stability tends, as a by-product, to promote the stability of the financial system.

1 The empirical analysis in this special feature draws heavily on D. Gerdesmeier, H.-E. Reimers and B. Roffia, “Asset price misalignments and the role of money and credit”, *ECB Working Paper Series*, No 1068, ECB, 2009.

2 See ECB, “Asset prices and monetary policy”, *Monthly Bulletin*, April 2005.

This special feature analyses the different approaches that can be used to detect asset price misalignments and summarises the available evidence on the indicator properties of money and credit for detecting these misalignments. Finally, it reports some results based on an empirical analysis aimed at detecting asset price busts for some euro area and industrialised countries.

#### APPROACHES TO IDENTIFYING ASSET PRICE MISALIGNMENTS

Detecting asset price misalignments is a difficult exercise even if done *ex post*. This is due to the episodic nature of such events and the coincidence of very different factors and constellations that can give rise to such episodes. Against this background, empirical analysis typically uses samples constructed from different countries, with the latter usually being restricted to a set of countries considered to be relatively homogeneous. This allows the extraction of common features across countries that can explain the underlying forces of such episodes in a robust manner.

Empirical models for the detection of asset price booms/busts differ with regard to both the underlying methodologies and the indicator variables used. The way in which the indicators are set up and/or the way in which their threshold levels are chosen has a considerable impact on how clearly and/or early the indication of asset price bubbles/busts can be derived. In particular, while country-specific thresholds might, in principle, be desirable from a theoretical perspective, most studies make use of thresholds that are *a priori* uniform across a set of given countries. Country-specific characteristics are then taken into account indirectly, either by using loss functions of individual policy-makers (which weight policy-makers' preferences *vis-à-vis* certain policy outcomes) or, as in panel estimations, by introducing individual dummy variables.

In the literature, many different approaches have been used to anticipate asset price bubbles/busts

Table D.1 Signal/event outcomes

|                      | Bust<br>(within 8 quarters) | No bust<br>(within 8 quarters) |
|----------------------|-----------------------------|--------------------------------|
| Signal was issued    | A                           | B                              |
| No signal was issued | C                           | D                              |

of different types. A first approach, which could be characterised as a “signalling approach”, looks for discrete thresholds for each indicator and calculates the respective noise-to-signal ratio, i.e. the ratio of the share of false alarms to the share of good signals. More precisely, the indicators are chosen such that they tend to exhibit an unusual behaviour prior to a boom/bust, whereby a boom/bust is defined to occur when certain developments in the variable of interest exceed/undershoot a threshold, e.g. their mean plus/minus a certain value.

Table D.1 illustrates this concept. In the matrix, cell A represents the number of times that an indicator signals that a bust will occur in eight quarters (in this specific example) and that bust actually occurs.<sup>3</sup> Similarly, cell B gives the number of times that the indicator issues a bad signal, while cell C indicates the number of times that the indicator fails to issue a signal of the bust occurring. Finally, cell D contains the number of times that the indicator refrains from issuing a signal when there was in fact no bust. A perfect indicator would only produce observations that belong to cells A or D, or such that it would minimise the noise-to-signal ratio. In the course of such minimisation, several criteria could be adopted. For instance, one could assume that policy-makers assign more weight to the risk of missing busts (type I error) than calling those which do not occur (type II error) as the costs of the two differ. Alternatively, one could also take into account the minimisation of an implicit or explicit loss function of the policy-maker in relation to predicting at least some busts.

3 The choice of the “appropriate” time horizon represents a trade-off between achieving good predictability (with a shorter horizon) at the expenses of not having enough lead time for the policy-maker to react.

The signalling approach was used, for example, by Kaminsky et al. in the context of currency crises, and – more recently – by Alessi and Detken for asset prices.<sup>4</sup> In most of the studies adopting this approach, the threshold levels are chosen so as to strike a balance between type I and type II errors. In particular, if the threshold is set to too high a value, this leads to fewer signals and, therefore, to the possibility of missing some busts. Conversely, if the threshold is too low, small fluctuations in the variables would issue more frequent alarms, part of which would, however, turn into false alarms ex post. In the case of Alessi and Detken, the thresholds that would signal booms are set at each point in time using an optimisation procedure (i.e. one that minimises a particular loss function of the policy-maker) based on the fixed optimal percentile to the distribution of the data available up to each point in time. Thresholds for each indicator are thus time and country-dependent, and, as they are based on past observations, they are “quasi real-time”.

An alternative approach used in the literature makes use of probit/logit regression techniques that test the occurrence of an asset price boom/bust by, for example, using the dependent variable as a one/zero variable which takes a value of one if there is a boom/bust on the basis of a specific criterion chosen, and zero otherwise. As stressed by Berg and Pattillo, this approach has many advantages.<sup>5</sup> First, it allows a test of the usefulness of the threshold concept; second, it allows aggregating predictive variables more satisfactorily into one composite indicator index, taking into account correlations among different variables; and, third, it permits the testing of the statistical significance of individual variables and the constancy of coefficients across time and countries.

This methodology consists of running bivariate and multivariate probit regressions on the panel data set and comparing several specifications of the probit models, whereby an assessment of specifications is done in terms of the probability scores and goodness-of-fit. Overall, these two types of approach can be seen as being

complementary and have been increasingly used in the literature, although there is no clear evidence of a superior performance of any of the two, also in the context of the most recent crisis.

#### MONEY AND CREDIT AGGREGATES AS INDICATORS OF ASSET PRICE MISALIGNMENTS

As pointed out by pioneering studies on the topic many years ago, boom and bust cycles in asset markets have historically been closely associated with large movements in monetary and credit aggregates.<sup>6</sup> There are, in fact, several reasons why monetary and asset price developments tend to be positively correlated. To start with, both sets of variables may react in the same direction to monetary policy or to cyclical shocks to the economy. For example, strong money and credit growth may be indicative of too lax a monetary policy, which leads to the creation of excessive liquidity in the economy and fuels excessive price increases in the asset markets.

Moreover, there can be self-reinforcing mechanisms at work. For example, during asset price booms, the balance sheet positions of the financial and non-financial sectors improve and the value of collateral increases, permitting a further extension of banking credit for investment, which may reinforce the increase in asset prices. The opposite mechanism can sometimes be observed during times of downward adjustments to asset prices.

4 See G. Kaminsky, S. Lizondo and C.M. Reinhart, “Leading indicators of currency crises”, *IMF Staff Papers*, Vol. 45, No 1, International Monetary Fund, 1998. In this specific study, a crisis is identified (ex post) as a situation in which the monthly percentage change of the variable is above its mean by more than three times the standard deviation. For the identification of asset price bubbles, see L. Alessi and C. Detken, “Real time early warning indicators for costly asset price boom/bust cycles: a role for global liquidity”, *ECB Working Paper Series*, No 1039, ECB, 2009.

5 See A. Berg and C. Pattillo, “Predicting currency crises: the indicators approach and an alternative”, *Journal of International Money and Finance*, Vol. 18, No 4, 1999. For a early warning signal model for predicting financial crises, based on a multinomial logit model, see, for example, M. Bussière and M. Fratzscher, “Towards a new early warning system of financial crises”, *ECB Working Paper Series*, No 145, ECB, 2002.

6 See I. Fisher, *Booms and depressions*, New York, Adelphi, 1932, and C. Kindleberger, *Manias, panics and crashes: a history of financial crises*, John Wiley, New York, 1978.

All studies confirm that the identification and quantification of asset price and/or financial imbalances represent an extremely difficult task, in particular from an ex ante point of view. Even ex post, different criteria can be used, each involving some degree of arbitrariness. This also explains some differences in the findings across studies.

This notwithstanding, one robust finding across the different studies is that various measures of excessive credit creation (e.g. a deviation of the credit-to-GDP ratio from its trend, global credit growth detrended) are very good leading indicators of the build-up of asset price misalignments in the economy.<sup>7</sup> Among the contributing studies on this issue, Borio and Lowe have constructed indicators that provide a fairly good sense of the build-up of imbalances as they develop.<sup>8</sup> The basic idea is that the imbalances manifest themselves in the coexistence of unusually rapid cumulative growth in private sector credit and asset prices. The indicators are intended to capture the coexistence of asset price misalignments with a limited capacity of the system to withstand the asset price reversal. Both of these indicators are measured on the basis of deviations of variables from their trends (“gaps”), which are calculated so as to incorporate only information that is available at the time the assessments are made. Asset price misalignments are captured by asset price gaps, in inflation-adjusted terms, while the shock absorption capacity of the system is proxied by credit gaps, where credit is measured as the ratio of private sector debt to GDP – a broad measure of leverage for the economy as a whole. Signals of future crises are issued when these gaps exceed certain thresholds.

This notwithstanding, it cannot be ruled out that money, representing a “natural” summary indicator, also possesses good indicator properties for asset price bubbles and busts. Indeed, excessive money creation is likewise singled out by some studies in the literature, although evidence is more mixed in this regard, possibly because substitution effects between money and asset prices can

sometimes be substantial, particularly in times of high financial turbulence and uncertainty.<sup>9</sup> However, high real money growth appears to be a useful indicator for a very early detection of the possible building-up of asset price misalignments that lead to financial distress and costly adjustments in the economy. As mentioned earlier, the observation that credit and money may be associated with asset price bubbles is often linked to the observation of very low interest rates, indicating that too loose monetary conditions are generally observed in the pre-crisis periods.

Overall, given the fact that the interactions between monetary and asset price developments are rather complex and as no mechanical link can be assumed, the overall results point to a need for a close monitoring of the nature of movements in money, credit and asset prices, complemented by a broader analysis of monetary conditions.<sup>10</sup>

## AN APPLIED METHOD FOR IDENTIFYING ASSET PRICE BUSTS

This section focuses on the selection of periods of asset price busts, while another strand of the literature focuses on asset price bubbles.<sup>11</sup> This choice is justified on the basis that the former

7 For currency crises see, for example, M. Bussière and M. Fratzscher (2002), op. cit.; for asset price misalignments, see C. Borio and P. Lowe, “Securing sustainable price stability: should credit come back from the wilderness?”, *BIS Working Papers*, No 157, Bank for International Settlements, 2004; Alessi and Detken (2009), op. cit.; C. Borio and M. Drehmann, “Assessing the risk of banking crises - revisited”, *BIS Quarterly Review*, Bank for International Settlements, March 2009; D. Gerdesmeier et al., (2009), op. cit.

8 See, C. Borio and P. Lowe, “Asset prices, financial and monetary stability: exploring the nexus”, *BIS Working Papers*, No 114, Bank for International Settlements, July 2002; and C. Borio and P. Lowe, “Assessing the risk of banking crises”, *BIS Quarterly Review*, Bank for International Settlements, December 2002.

9 See, for example, C. Detken and F. Smets, “Asset price booms and monetary policy”, in Horst Siebert (ed.), *Macroeconomic Policies in the World Economy*, Springer, Berlin, 2004; and R. Adalid and C. Detken, “Liquidity shocks and asset price boom/bust cycles”, *ECB Working Paper Series*, No 732, ECB, 2007.

10 See, for instance, Borio and Lowe (2002, 2004), op. cit.; M.D. Bordo and O. Jeanne, “Monetary policy and asset prices: does ‘benign neglect’ make sense?”, *International Finance*, Vol. 5, No 2, 2002.

11 See, for instance, Detken and Smets (2004), op. cit.; and Adalid and Detken (2007), op. cit.

are widely recognised as being more damaging for the economy, whereas booms/bubbles do not necessarily end in busts.<sup>12</sup>

A variety of approaches has been used in the literature to identify asset price busts. Bordo and Jeanne, for instance, define a bust as a period in which the three-year moving average of the growth rate of asset prices is smaller than the average growth rate less a multiple (1.3 in this specific case) of the standard deviation of growth rates.<sup>13</sup> In a similar vein, the IMF defines busts as periods when the four-quarter trailing moving average of the annual growth rate of asset prices, in real terms, falls below a particular threshold, which is set at -5% for house prices and -20% for stock prices.<sup>14</sup> These thresholds are roughly equal to the average growth rate of the respective asset prices across the whole sample less one times the standard deviation of the growth rates.

The selection of episodes of asset price busts, as is illustrated in this section, is based on a combination of the methodologies presented in the literature.<sup>15</sup> In particular, several studies have focussed separately on stock prices or on house prices. In other cases, the composite asset price indicator constructed at the Bank for International Settlements (BIS) has been used, which is calculated as the weighted average of equity prices, residential and commercial property prices, deflated with the national consumption deflators.<sup>16</sup> This indicator was developed for several of the major industrialised countries, thereby summarising the information contained in the separate movements of the three asset prices, i.e. equities and residential and commercial property. The intention was that such an index would facilitate the comparison of the broad asset price movements over time and across countries, give some empirical content to notions of general asset price inflation and deflation, and highlight patterns of behaviour that would otherwise remain undetected.<sup>17</sup>

Along these lines, a more recent paper presents the construction of a composite asset price indicator that combines the stock price index

and the house price index (both in quarter-on-quarter growth rates) and that can be easily updated in real time.<sup>18</sup> The two growth rates are weighted and calculated recursively throughout the sample period, and the weighting scheme used for the two series is generally inversely proportional to their conditional variance.

An asset price bust is defined on the basis of this composite indicator, and is denoted as a situation in which the composite asset price indicator declines with respect to its peak by a certain amount at the end of a certain period.<sup>19</sup> In this special feature, the occurrence of a bust (i.e. a value of 1 for the “dummy bust” variable) is denoted as a situation in which at the end of the rolling period (specifically, 12 quarters) the composite indicator has declined to below its mean minus a factor of 1.5 times the standard deviation in the period from 1 to 12 with respect to the maximum reached in the same period.<sup>20</sup>

12 In the signalling approach, this issue is usually taken into account by differentiating between “high-cost” and “low-cost” booms (see, for instance, Detken and Smets (2004), op. cit.).

13 Bordo and Jeanne (2002), op. cit.

14 IMF, “Lessons for monetary policy from asset price fluctuations”, *World Economic Outlook*, Chapter 3, International Monetary Fund, 2009.

15 See the methodologies developed by Berg and Pattillo (1999), op. cit.; I. Andreou, G. Dufrénot, A. Sand-Zantman and A. Zdzienicka-Durand, “A forewarning indicator system for financial crises: the case of six central and eastern European countries”, *William Davidson Institute Working Paper*, University of Michigan, No 901, 2007. It could, of course, be envisaged to use, for robustness check, alternative approaches derived from theory to quantify the fundamental equilibrium values, such as the price-earning ratio adjusted for the cyclical position.

16 C. Borio, N. Kennedy and S.D. Prowse, “Exploring aggregate asset price fluctuations across countries, measurement, determinants, and monetary policy implications”, *BIS Economic Papers*, No 40, Bank for International Settlements, 1994; and S.V. Arthur, “Experience with constructing composite asset price indices”, *BIS Working Papers*, No 21, Bank for International Settlements, 2005.

17 However, it should also be noted that combining two different markets (such as the housing and equity markets) in a single indicator can, in some cases, be misleading. This happens, for instance, when the two markets move sharply in opposite directions, so that the developments in the composite indicator would mask diverging trends and may not flag the true risks existing in that respective market. This problem may become more pronounced if house and equity price cycles tend to exhibit different dynamics.

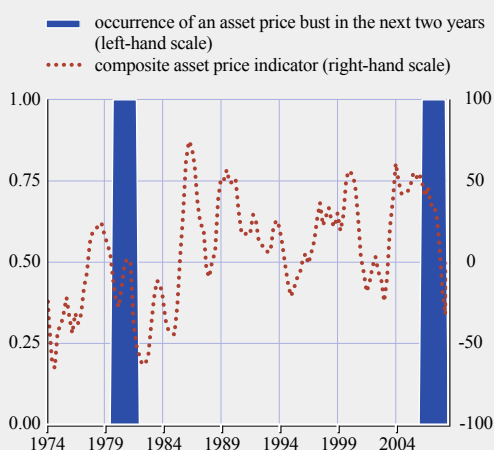
18 See Gerdesmeier et al. (2009), op. cit.

19 See Andreou et al. (2007), op. cit.

20 The threshold used generally comprises between 1.5 and 3 standard deviations above the mean. The greater the number of the standard deviation, the smaller the number of identified crises.

**Chart D.1 Asset price misalignments in the euro area**

(Q1 1974 – Q3 2008; percentage change per annum; (0.1) probability range)



Sources: ECB, BIS, Thomson Reuters Datastream, Reuters, national sources and ECB calculations.

**Table D.2 Asset price busts detected by the composite indicator**

(Q1 1970 – Q3 2008; based on a sample of 17 countries)

| Country        | No of busts |
|----------------|-------------|
| Australia      | 6           |
| Canada         | 7           |
| Denmark        | 4           |
| France         | 3           |
| Germany        | 6           |
| Ireland        | 6           |
| Italy          | 2           |
| Japan          | 6           |
| Netherlands    | 6           |
| New Zealand    | 5           |
| Norway         | 9           |
| Portugal       | 4           |
| Spain          | 6           |
| Sweden         | 6           |
| Switzerland    | 6           |
| United Kingdom | 3           |
| United States  | 6           |

Sources: ECB, BIS, Thomson Reuters Datastream, Global Financial Data, OECD Main Economic Indicators, Reuters, national sources and ECB calculations.

However, in line with other studies, an attempt is made to predict busts several months ahead. In line with this, the “bust dummy” is defined such that the indicator is expected to be able to signal a bust up to eight quarters ahead, with this period being referred to as the “signalling horizon”. Thus, a signal that is followed by a bust within two years is labelled a “good” signal, while a signal not followed by a bust within that interval of time is called a “false” signal. Chart D.1 shows the results obtained when applying such a procedure to the euro area.

On the basis of this construction and using a sample comprising 17 OECD countries for the period from 1970 to 2008, the overall number of busts detected with this method totals 93 (see Table D.2). In geographical terms, the countries in the south and centre of Europe (i.e. France, Germany, Italy, Portugal, Spain and Switzerland) account for about 30% of the crises, while 16.5% of the crises seem to occur in the three largest currency areas excluding the euro area (i.e. Japan, the United Kingdom and the United States). The rest of the crises are distributed among the countries of northern Europe (i.e. Denmark, Ireland, the Netherlands,

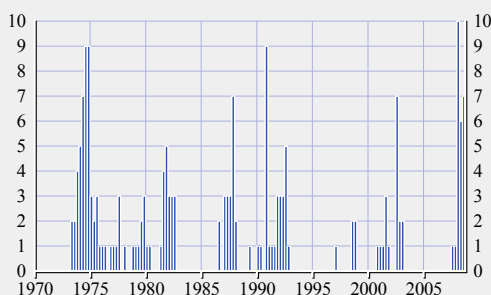
Norway and Sweden) (33%) and the remaining overseas countries (20%).

When looking at the occurrence of the busts over time, busts seem to be concentrated mainly in periods around the early/mid-1970s (oil crisis), the early and late 1980s (1987 stock market crashes), the mid-1990s (period of banking and currency crises), early 2000 (dot-com bubble) and, especially towards the end of the sample, in 2008 when a bust was experienced in 13 out of 16 countries, thus marking the most widespread cluster of busts in both house and stock prices (see Chart D.2).

Of course, it must be noted that, when looking at the disaggregated level of the developments in the composite indicator, the occurrence of a bust may be driven by specific developments in one of the two markets comprising the aggregate indicator. For instance, as regards the bursting of the dot-com bubble in 2000, not all countries experienced a bust. This was mainly due to the fact that in those countries in which the bust was not detected, the housing market was on an expansionary trend, thus partly counterbalancing the stock market developments.

**Chart D.2 Number of euro area countries experiencing asset price busts**

(Q1 1970 – Q3 2008; based on a sample of 17 countries)



Sources: ECB, BIS, Thomson Reuters Datastream, Global Financial Data, OECD Main Economic Indicators, Reuters, national sources and ECB calculations.

Finally, the length of the crises also varies across the countries, lasting either two quarters or more than one year. Overall, these observations lead to the conclusion that an analysis that takes into account heterogeneities across countries and time has to be adopted.

Seen from a financial stability perspective, it is worth noting that all major banking crises in industrial countries during the post-war period coincided with housing price busts, whereby the latter were less frequent than equity price busts, but more costly in terms of output losses.<sup>21</sup> In addition, when comparing the above composite asset price busts with the episodes of banking distress highlighted by Bordo et al., it appears that in many cases the two episodes were concomitant, while in few cases the banking distress periods followed the busts with a slight delay.<sup>22</sup>

### SOME RESULTS OF A PROBIT-TYPE APPROACH

In this section, an analysis based on a panel probit-type approach is presented, whereby the conditional probability of a bust is evaluated directly on the basis of a given set of indicators. The idea is to separate time periods into a bust and a tranquil/normal period, and mapping a set of indicators, as suggested a priori by theory, into a known probability distribution of these

episodes, in order to evaluate the likelihood of a bust using logit/probit models.

Panel data have the advantage of incorporating information across countries, as well as across time.<sup>23</sup> More formally, the probit equation takes a general form whereby the determinants consist of the fundamental variables that may, according to the theory, have some indicator properties, while the binary left-hand variable would indicate whether the event bust occurred. In line with some earlier literature, the fundamental variables (both in nominal and in real terms) are grouped into four categories.<sup>24</sup> The category of monetary variables comprises broad money and credit, the category of real variables comprises investment, consumption and GDP, the category of financial variables comprises the long-term and short-term interest rates, stock prices, the price/earnings ratio, the dividend yields and the (nominal and real) effective exchange rates, and the prices category includes all the deflators, consumer prices and house prices. The dataset used for the analysis consists of quarterly data collected for the countries mentioned in the previous section and spans more than three decades, starting in the first quarter of 1969 and ending in the third quarter of 2008.<sup>25</sup> The variables are measured in different ways, either as annual percentage changes or as a deviation from a trend or as a ratio to GDP.<sup>26</sup> Using probit techniques, the probability of the occurrence of a bust in the next eight quarters is

21 See T. Helbling and M. Terrones, "When bubbles burst", *World Economic Outlook*, Chapter 2, International Monetary Fund, Washington, 2003.

22 See M. Bordo, B. Eichengreen, D. Klingebiel and M.S. Martinez-Peria, "Is the crisis problem growing more severe?", *Economic Policy*, Vol. 32, Spring, 2001.

23 See B.H. Baltagi, *Econometric analysis of panel data*, John Wiley and Sons, New York, 1995.

24 See, for instance, M. Kumar, U. Moorthy and W. Perraudin, "Predicting emerging market currency crashes", *Journal of Empirical Finance*, Vol. 10, 2003.

25 For the main sources of the series, see Gerdesmeier et al. (2009), op. cit., Annex 3.

26 The trend is calculated using the Christiano-Fitzgerald filter, since the Hodrick-Prescott filter is known to suffer from an end-of-sample problem. The choice of using the ratio of credit to GDP is that it is a proxy for a leading indicator that captures the influence of banking crises, with credit expanding prior to a crisis and contracting afterwards.

estimated, whereby the bust is defined using the method outlined in the previous section. As regards the standard errors of the probit estimates, the heteroskedasticity and autocorrelation corrected (HAC) procedure as developed by Berg and Coke is applied, which produces accurate estimates, following the methodology proposed by Estrella and Rodrigues.<sup>27</sup>

The various probit models are compared in terms of performance on the basis of the significance of the coefficients, as well as other statistical tests, which also assess the predicted probabilities and the observed outcomes.<sup>28</sup> Generally speaking, the signs of the coefficients should be interpreted as having an increasing or decreasing effect on the probability of a bust. The credit variable seems to be a key driving factor. In order to verify this hypothesis, the main preferred specifications are run without this variable, but this leads to a substantial decrease in the explanatory power and the measures for the quality of the model. Across the equations with the best performance, the one that includes the credit gap, long-term nominal interest rates, the investment-to-GDP ratio and the house prices gap is singled out on the basis of some statistical tests.<sup>29</sup>

Overall, these results support the importance that credit aggregates have – together with monetary aggregates – in the context of the monetary analysis, insofar as they enable central banks to assess longer-term risks to price stability, including emerging financial imbalances, costly asset price misalignments or other threats to financial stability.

Viewed from a forward-looking perspective, designing a good forecasting model requires striking a balance between type I and type II errors. In the discrete choice approach used in this special feature, the expected value of crises, given a specific set of indicators, is a probability measure. As in the literature, there is no correct answer with respect to the value that should be assigned to the optimal threshold level of the probability; as a rule of thumb, a threshold level

of 25% is usually selected.<sup>30</sup> Based on a more conservative approach, a 35% threshold is used for the most preferred specifications, on the basis of which those models are able to predict correctly around 66% to 70% of the crises, while the missed calls for crises are in the range of 25% to 30%. The false alarms are of a similar size as the missed calls, while the noise-to-signal ratio is in the range of 36% to 41%.<sup>31</sup>

#### A “PSEUDO REAL-TIME” EXERCISE: A EURO AREA APPLICATION

The results so far might be criticised on the basis that the model has proven to have a good fit from an ex post perspective. This, however, does not necessarily imply that the model also has good forecasting abilities in real time. In order to address this issue, a real-time exercise for the euro area is carried out. More precisely, the model is estimated up to the fourth quarter of 2006 and – on the basis of the coefficients and the actual values of the explanatory variables – the probability that the model would have predicted a bust to occur over the subsequent two years in the euro area is estimated.

Chart D.3 shows the results of this exercise. Two periods of busts are detected for the euro area (one being the most recent period), which suggests that, at the euro area aggregate

27 See A. Berg and R.N. Coke, “Autocorrelation-corrected standard errors in panel probits: an application to currency crisis prediction”, *IMF Working Paper*, WP/04/39, International Monetary Fund, 2004; and A. Estrella and A.P. Rodrigues, “Consistent covariance matrix estimation in probit models with autocorrelated errors”, *Staff Report*, No 39, Federal Reserve Bank of New York, 1989.

28 See J.P.A.M. Jacobs, G.H. Kuper and L. Lestano (2005), “Currency crises in Asia: a multivariate logit approach”, *CCSO Working Papers* 2005/06, University of Groningen; and F.X. Diebold and G. Rudebusch, “Scoring the leading indicators”, *Journal of Business*, Vol. 62, No 3, 1989.

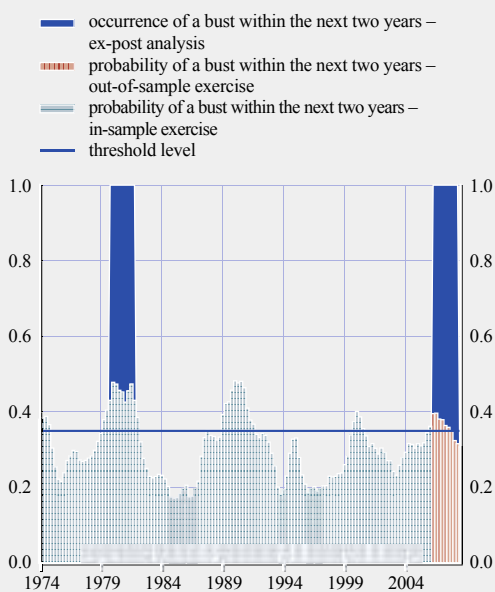
29 In IMF (2009), op. cit., the same variables are found to be of relevance in the run-up to costly house price busts.

30 For instance, in Berg and Pattillo (1999), op. cit., the choice of a threshold of 25% leads to an accuracy of predicting crises of about 73%, while that of false alarms is 41%.

31 In a number of cases, the noise-to-signal ratio could be made arbitrarily small by tightening the selectivity of the threshold. Of course, the choice of the threshold could be carried out more formally by assigning specific weights to the costs of type I and type II errors.

**Chart D.3 Out-of-sample forecast of the probability of asset price busts in the euro area**

(Q1 1974 – Q3 2008)



Sources: ECB, BIS, Thomson Reuters Datastream, national sources and ECB calculations.

level, developments in some countries are counterbalanced by movements in others.

As can be seen from the chart, the model would have predicted the most recent bust to occur within a two-year-ahead horizon with a probability higher than 40%, clearly above the selected threshold level. At the same time – abstracting from the initial few years that are needed for the initialisation of the model – the model would also have predicted the bust in 1979-1982, but it would likewise have predicted two other crises that are not included in the set of busts. However, at least as regards the first bust, a plausible explanation may be attributable to the fact that that bust period predicted by the model (1989-1992) was more related to the period of German reunification (driving up house prices in Germany) and the crisis of the European Monetary system (EMS), so that it cannot be labelled as a bust according to the criterion chosen. Finally, it should be noted that, while the model predicts a bust to occur within the following two years, it does not provide any

information on the length of the busts and on when the bust period will be over and normal conditions are re-established.

## CONCLUDING REMARKS

This special feature presents a composite asset price indicator that incorporates developments in both the stock and the housing markets. In addition, asset price busts are defined and an empirical analysis is carried out on the basis of a probit-type approach. According to statistical tests, credit aggregates, nominal long-term interest rates and the investment-to-GDP ratio, together with developments in either house prices or stock prices, turn out to be the best indicators that help to predict asset price busts up to eight quarters ahead.

Putting these results into perspective, the ECB's analysis of monetary and credit developments with the aim of identifying longer-term inflation risks can also provide signals of growing financial imbalances. By exploiting the link between monetary and credit developments and evolving imbalances in asset and credit markets, the ECB's monetary analysis (consisting of a comprehensive assessment of liquidity and credit conditions) may provide early information on developing asset price imbalances and, therefore, allow a timely response to the implied risks to price and financial stability. In this respect, it should be noted that the approaches illustrated in this analysis could be used as input into several areas, including, for instance, financial supervision and systemic risk analysis in addition to the regular monetary analysis.

## E THE IMPORTANCE OF INSURANCE COMPANIES FOR FINANCIAL STABILITY

*Insurance companies can be important for the stability of financial systems mainly because they are large investors in financial markets, because there are growing links between insurers and banks and because insurers are safeguarding the financial stability of households and firms by insuring their risks.*

*This special feature discusses the main reasons why insurance companies can be important for the stability of the financial system. It also highlights the special role of reinsurers in the insurance sector and discusses some of the key differences between insurers and banks from a financial stability point of view.*

### INTRODUCTION

The insurance sector has traditionally been regarded as a relatively stable segment of the financial system. This is mainly because most insurers' balance sheets, unlike those of banks', are composed of relatively illiquid liabilities that protect insurers against the risk of rapid liquidity shortages that can and do confront banks. In addition, insurers are not generally seen to be a significant potential source of systemic risk. One of the main reasons for this view is that insurers are not interlinked to the same extent as banks are, for instance, in interbank markets and payment systems.

The insurance sector can, however, be a source of vulnerability for the financial system, and the failure of an insurer – an event that has occurred from time to time – can create financial instability. In addition, the traditional view that insurers pose limited systemic risk can be challenged, however, because it does not take account of the fact that interaction between insurers, financial markets, banks and other financial intermediaries has been growing. It is important, however, to recognise that insurance companies, given their role as mitigators of risk and their often long-term investment horizons, often also support financial stability.

The importance of insurers for financial stability is also increasing as the size of the euro area insurance sector has grown rapidly over the last decade. For example, euro area insurers' financial assets increased by some 90% from early 1999 to 2008, or from 35% to 50% of euro area GDP. This growth was mainly driven by economic development, which raised the demand for non-life insurance, and ongoing public reforms in pension systems, which encouraged an ageing population to allocate more savings to life insurers (and pension funds). As these developments are likely to continue in the future, it is to be expected that the growing role of the insurance sector will continue in the years ahead.

Because of the importance of insurers for financial stability, the ECB regularly monitors and analyses the conditions in, and risks confronting, the euro area insurance sector. This analysis has been published in the Financial Stability Review (FSR) since the first issue of December 2004.

### INSURANCE COMPANIES AND FINANCIAL STABILITY

There are three main reasons why insurers are important for the stability of the financial system.<sup>1</sup> First, insurers are large investors in financial markets.<sup>2</sup> Second, insurers often have close links to banks and other financial

1 For discussions of the importance of insurance companies for financial stability, see also, J.-C. Trichet, "Financial Stability and the Insurance Sector", The Geneva Paper, No 30, 2005; J.-C. Trichet, "Developing the work and tools of CEIOPS: the views of the ECB", keynote speech at the CEIOPS conference on "Developing a new EU regulatory and supervisory framework for insurance and pension funds: the role of CEIOPS", November 2005; J.-C. Trichet, "Insurance companies, pension funds and the new EU supervisory architecture", keynote speech at the CEIOPS annual conference 2009, November 2009; ECB, *Potential impact of Solvency II on financial stability*, July 2007; P. Trainar, "Insurance and financial stability", *Banque de France Financial Stability Review*, November 2004; International Association of Insurance Supervisors, "Systemic risk and the insurance sector", October 2009; U.S. Das, N. Davies and R. Podpiera, "Insurance and issues in financial soundness", *IMF Working Paper*, No 03/138, IMF, July 2003; and G. Häusler, "The insurance industry, fair value accounting and systemic financial stability", speech at the 30th General Assembly of the Geneva Association, June 2003.

2 See also, IMF, "The Financial Market Activities of Insurance and Reinsurance Companies", *Global Financial Stability Report*, June 2002.

institutions, and problems confronting an insurer can therefore spread to the banking sector. Third, insurers contribute to the safeguarding of the stability of household and firm balance sheets by insuring their risks.

### INSURANCE COMPANIES AS LARGE FINANCIAL MARKET INVESTORS

Insurance companies, especially composite and life insurers, are large investors in financial markets since they invest insurance premiums received from policyholders. The total value of the investment assets of euro area insurers amounted to €4.4 trillion in 2008 (see Table E.1). Most of the time, given their often long-term investment horizons, insurers are a source of stability for financial markets. However, because of the sheer size of their investment portfolios, reallocations of funds or the unwinding of positions by these institutions has the potential to move markets and, in the extreme, affect financial stability by destabilising asset prices.

The largest asset class in which euro area insurers invest is debt and other fixed income

securities. Direct investment by euro area insurers in such securities amounted to over €2 trillion in 2008 (see Table E.1). On average, large euro area insurers have about half of their bond holdings in corporate bonds and half in government bonds. Because of these large government and corporate bond investments, the investment behaviour of insurers has the potential to affect long-term interest rates and pricing in the secondary markets. Furthermore, it makes insurers important for the provision of financing to both governments and firms. For example, around 20% of the debt securities issued by euro area governments are held by euro area insurers and pension funds.

Out of the total of €4.4 trillion they hold in investment assets, euro area insurance companies' equity holdings amount to around €550 billion (see Table E.1). Equity investment shares of insurers, however, were higher before the bursting of the dot-com bubble and the slump in equity prices in 2001 and 2002 induced many insurers to liquidate part of their portfolios. In addition, most insurers reduced their equity

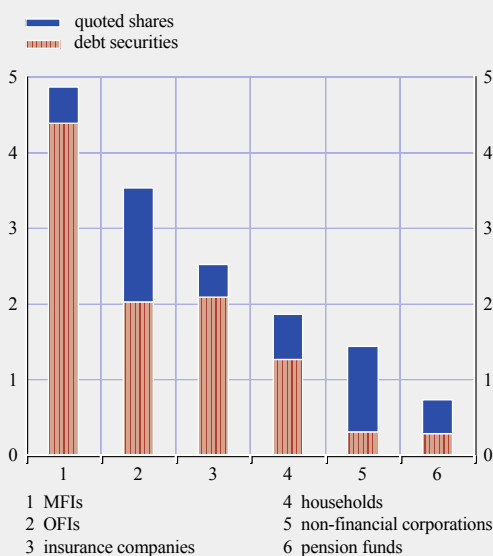
**Table E.1 Investments of euro area insurance companies**

| (2008)                                                                        |                 |              |                   |              |                    |              |                 |              |                 |              |
|-------------------------------------------------------------------------------|-----------------|--------------|-------------------|--------------|--------------------|--------------|-----------------|--------------|-----------------|--------------|
|                                                                               | Life insurers   |              | Non-life insurers |              | Composite insurers |              | Reinsurers      |              | Total           |              |
|                                                                               | EUR<br>billions | (%)          | EUR<br>billions   | (%)          | EUR<br>billions    | (%)          | EUR<br>billions | (%)          | EUR<br>billions | (%)          |
| <b>Total investments where the insurers bear the investment risk</b>          | <b>1,627</b>    | <b>78.6</b>  | <b>648</b>        | <b>100.0</b> | <b>1,099</b>       | <b>86.5</b>  | <b>366</b>      | <b>99.8</b>  | <b>3,741</b>    | <b>85.9</b>  |
| Lands and buildings                                                           | 32              | 2.0          | 27                | 4.2          | 34                 | 3.1          | 4               | 1.1          | 98              | 2.6          |
| Investments in affiliated enterprises and participating interests             | 86              | 5.3          | 103               | 15.8         | 57                 | 5.2          | 169             | 46.1         | 415             | 11.1         |
| Shares and other variable-yield securities and units in unit trusts           | 272             | 16.7         | 121               | 18.7         | 130                | 11.9         | 29              | 8.0          | 552             | 14.8         |
| Debt securities and other fixed income securities                             | 912             | 56.1         | 276               | 42.6         | 824                | 75.0         | 79              | 21.5         | 2,091           | 55.9         |
| Participation in investment pools                                             | 6               | 0.4          | 2                 | 0.3          | 6                  | 0.6          | 0               | 0.0          | 14              | 0.4          |
| Loans guaranteed by mortgages                                                 | 81              | 5.0          | 6                 | 0.9          | 5                  | 0.4          | 0               | 0.0          | 92              | 2.5          |
| Other loans                                                                   | 177             | 10.9         | 82                | 12.7         | 11                 | 1.0          | 3               | 0.7          | 272             | 7.3          |
| Deposits with credit institutions and other financial investments             | 47              | 2.9          | 24                | 3.7          | 24                 | 2.2          | 11              | 2.9          | 106             | 2.8          |
| Deposits with ceding enterprises                                              | 14              | 0.9          | 7                 | 1.0          | 8                  | 0.7          | 72              | 19.7         | 101             | 2.7          |
| <b>Investments (unit-linked) where policyholders bear the investment risk</b> | <b>444</b>      | <b>21.4</b>  | <b>0</b>          | <b>0.0</b>   | <b>167</b>         | <b>13.2</b>  | <b>1</b>        | <b>0.2</b>   | <b>612</b>      | <b>14.0</b>  |
| <b>Total investment assets</b>                                                | <b>2,071</b>    | <b>100.0</b> | <b>648</b>        | <b>100.0</b> | <b>1,270</b>       | <b>100.0</b> | <b>367</b>      | <b>100.0</b> | <b>4,357</b>    | <b>100.0</b> |

Sources: Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS) and ECB calculations.

**Chart E.1 Quoted shares and debt securities held by euro area institutional sectors**

(2008; EUR trillions)



Sources: ECB, Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS) and ECB calculations.  
Note: MFIs denotes monetary financial institutions and OFIs denotes other financial intermediaries.

investments significantly further during the current financial crisis, in an attempt to derisk their balance sheets and reduce volatility in their earnings (see also Section 5 in this FSR).

In addition to insurers' own investment, they hold about €600 billion of investment on behalf of unit-linked life insurance policyholders (where the policyholder bears the investment risk).

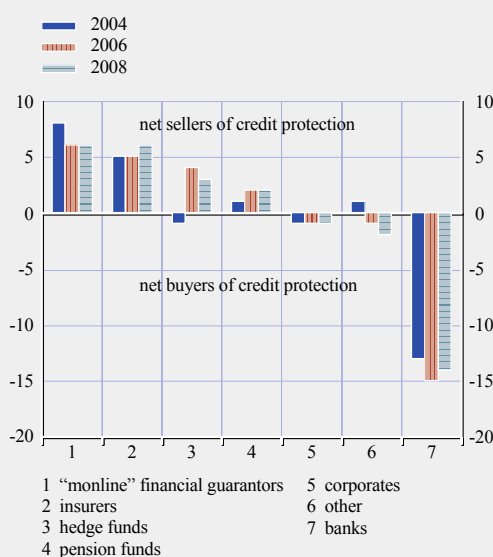
Insurance companies are the third largest type of investor in quoted shares and debt securities after monetary financial institutions (MFIs) and other financial intermediaries (OFIs). Because of the large share of their investment in debt securities, the relative importance of the insurance sector in these markets is higher than in the quoted shares markets (see Chart E.1).

In addition to investments in equities and debt securities, the insurance sector as a whole was a net seller of credit protection during the first decade of this century (see Chart E.2).<sup>3</sup> It should be noted, however, that insurers withdrew almost completely from this activity during the current financial crisis. Nevertheless, many insurers still have large amounts of credit default swap (CDS) contracts outstanding. The involvement of insurers in the credit derivatives markets, however, varied significantly across institutions and was concentrated on a limited number of institutions. For example, the US insurer American International Group (AIG) was the by far largest seller of credit protection among insurers. It had a net notional CDS exposure of USD 205 billion in September 2009, down from USD 447 billion in June 2008.<sup>4</sup>

Insurers also have investments in structured credit products such as residential and commercial mortgage-backed securities

**Chart E.2 Global net positions in credit derivatives, by type of investor**

(percentage)



Source: British Bankers Association.  
Note: The data include single-name CDSs, full index trades, synthetic collateralised debt obligations (CDOs) and tranch index trades.

3 See also International Association of Insurance Supervisors, "IAIS paper on credit risk transfer between insurance, banking and other financial sectors" March 2003; IMF, "Risk transfer and the insurance industry", *Global Financial Stability Report*, April 2004; and ECB, *Credit risk transfer by EU banks: activities, risks and risk management*, May 2004.

4 See AIG's 10-Q form to the Securities and Exchange Commission, June 2008 and September 2009.

(RMBSs and CMBSs).<sup>5</sup> The level of exposures across insurers, however, varies significantly. Furthermore, insurers have generally invested in less risky parts of structured credit products, and exposures to products that reference US sub-prime mortgages were and are generally low. This saved most euro area insurers from the large losses on such investment that many banks incurred after the outbreak of the current financial market turmoil in 2007.

Although the extensive investment activities of insurers have the potential to affect financial asset prices negatively, insurers generally have a long-term investment horizon since they receive premiums up front for policies that often run over many years. Insurers can therefore help to stabilise prices in financial markets as they are less likely than many other investors to liquidate investments when financial asset prices are falling. However, insurance companies are in some cases restricted by supervisors in their investments and may only hold high-rated assets. Rating downgrades of securities held by insurance companies can therefore force them to sell assets in falling markets, thereby contributing to the negative developments.

The potential for insurers to stabilise financial asset prices is sometimes overvalued as there is the misperception at times that insurers do not have to fair value their investments and that they are thus not affected by temporary value changes. In general, large listed insurers have to fair value their investments, but it often takes longer than in the case of banks before fair value losses are recorded in the profit and loss accounts. This is because, in general, insurers reporting under the International Financial Reporting Standards (IFRSs) mainly classify their investments as “available for sale”. The investments are then recorded at fair value on insurers’ balance sheets, with any losses that are recorded leading to movements in shareholders’ equity. However, no loss is recorded in the profit and loss account unless the investment is considered to be impaired.<sup>6</sup> Many IFRS-reporting insurers have, however, imposed a policy on themselves that

triggers impairments when the value of their equity investment falls, for example, 20% below the acquisition costs, or remains below the acquisition cost for longer than a certain predefined period (of, typically, six to 12 months). For credit investment, a charge against earnings is taken when there is a delay in the payment of interest or principal. Such valuation policies can limit the possibilities for insurers to act as long-term investors.

Looking ahead, the proposed changes by the International Accounting Standards Board (IASB) to financial instrument reporting are likely to have an impact on insurers’ investment behaviour.<sup>7</sup> The IASB has proposed abolishing the “available for sale” category for financial instruments. This would have a major impact on insurers, since they currently classify most of their financial assets in this category. The change is likely to lead to increases in insurers’ reported book values of debt securities (as well as corresponding increases in shareholders’ equity), since most of them would be moved to the amortised cost category. This would reverse previously reported unrealised losses in shareholders’ equity.

A further impact of the proposed change by the IASB is likely to be that equity holdings would, in principle, be marked to market through the profit and loss account. This could create more volatility in insurers’ earnings. To avoid this, some market participants believe that the moves by many insurers in recent quarters away from equities in their investments were partly driven by the proposed change and that insurers might be less inclined to invest in equities in the future.

5 For further details, see ECB, *Financial Stability Review*, December 2008.

6 This differs from the practices of banks that generally record most securities “at fair value through profit and loss”, which means that the assets are marked to market through the profit and loss account.

7 See International Accounting Standards Board, “Financial Instruments: Classification and Measurement”, July 2009, and JPMorgan Chase & Co., “European insurance: IAS 39 accounting changes could have profound impact on reported numbers”, July 2009.

### INSURANCE COMPANIES' LINKS WITH BANKS

From a financial stability perspective, the identification of linkages between the banking and the insurance sectors is of importance because such linkages determine the channels through which potential problems in one sector could be transmitted to another. Such contagion channels can be either indirect – e.g. via insurers' financial market activities (as described above) – or direct through ownership links and credit exposures (discussed hereafter).

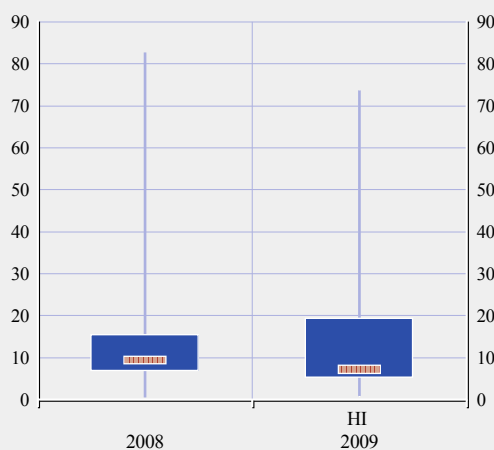
In recent decades, the direct ownership links between banking groups and insurance undertakings have increased and many “financial conglomerates” that offer both banking and insurance products have emerged. The reasons for conglomeration were mainly to diversify income streams, to reduce costs and to take advantage of established product distribution channels. In addition, some banks and insurers saw benefits in joining the different balance sheet structures of banks – the assets of which have a longer maturity than their liabilities – and insurers – which generally have liabilities with a longer maturity than their assets – to reduce balance sheet mismatches.

It is more common that banks in the euro area engage in insurance underwriting than that insurers engage in banking activities. For example, of the 19 large and complex banking groups (LCBGs) in the euro area that are analysed in this FSR (see Section 4), 14 are considered to be financial conglomerates with significant insurance activities.<sup>8</sup> Eight of the LCBGs regularly report insurance activities separately in their financial accounts.<sup>9</sup> The average contribution of insurance activities to total operating income of these LCBGs was about 7% in 2008 and the first half of 2009 (see Chart E.3). However, these shares vary widely across institutions and some LCBGs derive a more substantial amount of their income from insurance business.

The strong links between insurers and banks have meant that insurance companies, or insurance business lines of banks, have become more

**Chart E.3 Contribution of insurance activities to the operating income of large and complex banking groups in the euro area**

(2008 – H1 2009; percentage of total operating income; maximum, minimum, interquartile distribution and median)



Sources: Individual institutions' financial reports and ECB calculations.

Note: Data for eight of the 19 large and complex banking groups in the euro area that reported insurance activities separately in their financial accounts for 2008 and the first half of 2009.

important for banking groups, and vice versa, and thus for financial stability. But the links between insurers and banks do not necessarily have to be strong as the perception of such

<sup>8</sup> According to the Directive 2002/87/EC of the European Parliament and of the Council of 16 December 2002 on the supplementary supervision of credit institutions, insurance undertakings and investment firms in a financial conglomerate and amending Council Directives 73/239/EEC, 79/267/EEC, 92/49/EEC, 92/96/EEC, 93/6/EEC and 93/22/EEC, and Directives 98/78/EC and 2000/12/EC of the European Parliament and of the Council – the Financial Conglomerates Directive (FCD) – a group qualifies as a financial conglomerate if more than 40% of its activities are financial and the group has significant cross-sector activities. For this latter criterion, two quantitative criteria, a relative and an absolute, are used. The relative criterion specifies that the proportions of both the banking and the insurance parts are within a 10%-90% range of total activities. These activities are measured by total assets and solvency requirements. The absolute criterion is that when the smaller activity has a balance sheet total larger than €6 billion, the group also qualifies as a financial conglomerate.

<sup>9</sup> Banks shall report their insurance activities separately if one of the three following quantitative criteria are met; 1) the insurance revenue is 10% or more of all operating segments; 2) the absolute amount of their reported profit or loss is 10% or more, in absolute amount, of (i) the combined reported profit of all operating segments that did not report a loss and (ii) the combined reported loss of all operating segments that reported a loss; and 3) the segment's assets are 10% or more of the combined assets of all operating segments.

links might be sufficient to trigger contagion, especially in times of financial instability.

Insurers are also important for banks as sources of equity capital and funding. As discussed above, insurance companies invest large amounts of funds in debt and equity markets. A significant amount of this is invested in the debt and equity issued by euro area banks. Some provisional estimates, based on internal ECB data for the second quarter of 2009, show that euro area insurance companies and pension funds held about €435 billion of debt securities issued by euro area MFIs. This represents about 10% of the total amounts outstanding of debt securities issued by euro area MFIs. At the same time, euro area insurers and pension funds held about €37 billion of quoted shares issued by euro area MFIs, which represents 8% of the total amount of shares issued by euro area MFIs.

As mentioned in the section above, insurance companies have also become increasingly more involved in financial transactions with banks – for example, in credit risk transfer markets – which has increased the linkages between the sectors.<sup>10</sup>

This type of exposure between insurers and banks came to the fore during the current financial turmoil where the problems faced by the US insurer AIG and some US-based “monoline” financial guarantors caused losses for banks across the globe. Losses on CDSs written by these insurers on structured credit products triggered rating downgrades on securities they had insured. These rating downgrades caused marking-to-market losses for institutions, often banks, that had bought credit protection. It should be noted, however, that AIG’s large exposures to structured credit products are not representative of the exposures of the global insurance sector as a whole, as most insurers do not have financial product units like AIG’s. Nonetheless, the problems for AIG indicate the types of risk that can build up in any large and complex financial group and suggest that financial stability monitoring needs to take account of at least the large entities in the insurance sector.

In addition, although the business conducted by financial guarantors was specialised and limited to a small number of companies, the impact their problems had on banks shows that smaller specialised insurers can also have close and important links with banks.

Because of the often strong direct and indirect links between insurance companies and banks, financial stability assessments of the banking sector should also consider links to insurance companies or banks’ insurance activities and the risks that such links and activities can pose.

#### INSURANCE COMPANIES AS PROMOTERS OF FINANCIAL STABILITY AMONG HOUSEHOLDS AND FIRMS

By insuring risks that households and firms are confronted with, insurance companies contribute to the stability of the balance sheets of these sectors. However, the links between insurers and non-financial sectors can occasionally give rise to potential financial stability concerns.

For instance, the default of an insurer – an event that has occurred from time to time – can cause financial distress in these sectors. This occurred, for example, in Australia in 2001 when the failure of HIH – the second largest non-life insurer in the country – led to the bankruptcy of some companies that had purchased insurance cover from HIH.<sup>11</sup> The default of an insurer or withdrawal of insurance coverage can also make it impossible or very difficult for firms to conduct certain business where insurance coverage is needed.

Insurance companies can also be of similar importance for households. For example, insurance policies on houses, cars and other physical assets protect households from large losses. In addition, life insurers are increasingly important for euro area households.

<sup>10</sup> See, F. Allen and D. Gale, “Systemic Risk and Regulation”, in M. Carey and M. Stulz (eds.), *The Risks of Financial Institutions*, The University of Chicago Press, 2006.

<sup>11</sup> See, G. Plantin and J.-C. Rochet, *When insurers go bust*, Princeton University Press, 2007.

The expected increase in the proportion of retirees in the population, and pension reforms underway in many euro area countries designed to encourage people to shift from public to private life insurance schemes, has increased the role played by life insurers in the economy. The amount of euro area households' assets invested in life insurance and pension funds has increased from €2.5 trillion at the beginning of 1999 to almost €5 trillion at the end of 2008 (see Chart E.4).<sup>12</sup> As a share of households' total financial assets, life insurance and pension fund investments has increased from 23% to 31% during the same period.

The important role insurers play for households and firms is the main reason why insurers are supervised. The prudential supervision of insurance companies and pension funds aims at promoting a sound and prudent management of these institutions also with a view to protecting policy holders and investors.

In addition to providing insurance coverage for firms and households, insurance companies sometimes also finance their investments. As already mentioned, insurance companies are

large buyers of corporate bonds, but in some cases they also extend loans to both firms and households.

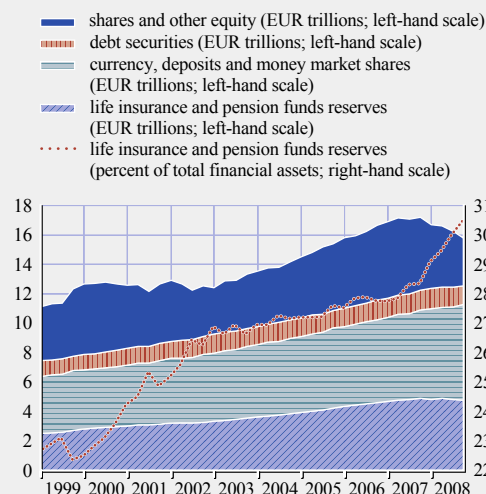
### THE SPECIAL ROLE OF REINSURERS

Although the reinsurance sector is much smaller than the primary insurance sector, it can still be seen as important for financial stability for two main reasons. First, reinsurers provide safety nets for primary insurers, and a reinsurer's financial difficulties can significantly affect the primary insurance sector. For example, if a reinsurer experiences financial stress, the problems could spread to many primary insurers if their reinsurance hedges were to fail to perform as expected. In this sense, reinsurance is a credit risk for primary insurers. It could also lead to a reduction in the availability of reinsurance coverage, which might force primary insurers to cut back on their underwriting, withdraw from capital markets and bolster solvency positions by other means. Second, because the business of reinsurers is to protect against extreme events, they are usually more exposed than primary insurers to rare and unexpected catastrophic events, such as natural disasters and terrorist attacks, the likelihood of which is difficult to quantify accurately.

The potential for a reinsurer to cause a systemic event within the primary insurance sector has increased in recent years, due to consolidation in the reinsurance sector. The global reinsurance sector is dominated by a handful of very large companies. For example, the four euro area reinsurers that are regularly monitored in this FSR have total combined assets of about €290 billion and they account for about 30% of total global reinsurance premiums written (see Section 5). What is more, the reinsurers themselves are interlinked as they distribute reinsurance exposures among one another (called retrocession). In retrocession markets, large and unique risks can be spread around the global reinsurance market to allow primary

**Chart E.4 Euro area households' financial assets**

(Q1 1999 – Q4 2008)



<sup>12</sup> A breakdown into life insurers and pension funds is not available, but life insurers account for about half of the total.

insurers to also reinsure risks that are too large for a single reinsurer.

### THE DIFFERENCE BETWEEN BANKS AND INSURANCE COMPANIES

Banks have a special role in the financial system on account of their central role in the transmission of monetary policy and their participation in payments systems. The interconnections between banks in interbank markets and payment systems can also cause problems faced by one bank to spread to others. Banks are therefore of particular importance for financial system stability. This importance is exacerbated by the fact that banks' assets (such as customer loans) are mostly long-term in character, whereas their liabilities (such as deposits) are of shorter-term duration. This leaves the banks vulnerable to depositor runs that can result in liquidity shortages. Insurers on the other hand, unlike banks, generally have liabilities with a longer maturity than their assets, which makes them less vulnerable to customer runs. In addition, insurers' liabilities are usually less liquid than bank deposits, as the possibility of withdrawing savings is restricted in most insurance contracts and is also more costly for customers.

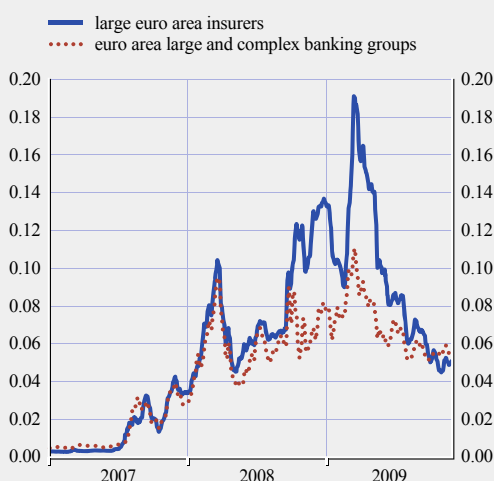
As discussed above, the insurance sector can be of considerable importance to financial system stability, but insurers do not pose the same systemic risk for the financial system as banks. This is because insurers are not as closely interconnected as banks are, since they do not directly participate in payments systems. This does not necessarily, however, mean that simultaneous defaults are less likely to occur in the insurance sector than in the banking sector, at least not during periods of financial turmoil. This can be exemplified by looking at the implied probability of two or more euro area insurers and euro area LCBGs defaulting at the same time – calculated by using CDS spreads and equity returns. This “systemic risk indicator” was somewhat lower for insurers than for the LCBGs before the outbreak of the financial market turmoil in the

summer of 2007, which implies that the systemic risk in the insurance sector was indeed perceived to be lower. However, the indicator displayed rather similar levels and developments for banks and insurers during the first year after the outbreak of the financial market turmoil (see Chart E.5). The similarity of developments among banks and insurers during this period could possibly be explained by the fact that many of the risks that insurers and banks faced during this period – such as financial markets risks – were the same. In October 2008, when problems in the banking sector intensified, the indicator for euro area insurers rose above that of banks, and it remained higher until September 2009. This development could probably be explained by the fact that banks received more support from governments than insurers did during this period, which reduced the likelihood of banks defaulting.

The traditional view that insurers pose less systemic risk than banks did not take into account the growing interaction between insurers, financial markets, banks and other financial intermediaries. As insurers are

**Chart E.5 Implied probability of two or more institutions defaulting simultaneously within the next two years**

(Jan. 2007 – Nov. 2009; probability; five-day moving average)



Sources: Bloomberg and ECB calculations.

Note: For details about how this indicator is constructed, see Box 16 in ECB, *Financial Stability Review*, December 2007.

increasingly more involved in financial transactions with other financial intermediaries, such as banks, the potential for problems confronting an insurer to spread in the financial system has increased. In addition, the insurance-linked securities market (with instruments such as catastrophe bonds) has created direct links between insurers as they sometimes buy such securities to diversify their own risk exposure, while benefiting from investment in instruments linked to their area of expertise.<sup>13</sup>

### CONCLUDING REMARKS

Although insurers can contribute to financial stability on account of both their capacity to reallocate risks in the economy and their often long-term investment horizons, they also have the potential to destabilise the financial system. In particular, a problem confronting an insurer could affect not only households and firms that have bought insurance, but also financial markets – via insurers’ investment activities – and banks and other financial institutions – via direct and indirect links.

All this warrants a regular analysis and monitoring of insurers’ financial performance and assessments of their risk by central banks, international organisations and other bodies that cover countries/regions where the insurance sector plays a significant role. In addition, given that the banking and insurance sectors have become increasingly interlinked, financial stability assessments should avoid an approach that is too sector-oriented and should take into account the linkages between these different parts of the financial system.

13 The development of insurance-linked securities markets has also created new links between insurers and investors in these markets which predominantly consist of dedicated securities funds, money managers, hedge funds and banks. See, ECB, *Financial Stability Review*, June 2008.



## GLOSSARY

**Adjustable-rate mortgage (ARM):** A mortgage with an interest rate that remains at a predetermined (usually favourable) level for an initial fixation period, but can thereafter be changed by the lender. While ARMs in many countries allow rate changes at the lender's discretion (also referred to as "discretionary ARMs"), rate changes for most ARMs in the United States are based on a pre-selected interest rate index over which the lender has no control.

**Alternative-A (Alt-A):** A mortgage risk category that falls between prime and sub-prime. The credit risk associated with Alt-A mortgage lending tends to be higher than that of prime mortgage lending on account of e.g. little or no borrower documentation (i.e. income and/or asset certainties) and/or a higher loan-to-value ratio, but lower than that of sub-prime mortgage lending due to a less (or non-)adverse credit history.

**Asset-backed commercial paper (ABCP):** A short-term debt instrument that is backed by a form of collateral provided by the issuer, which generally has a maturity of no more than 270 days and is either interest-bearing or discounted. The assets commonly used as collateral in the case of financing through ABCP conduits include trade receivables, consumer debt receivables and collateralised debt obligations.

**Asset-backed security (ABS):** A security that is collateralised by the cash flows from a pool of underlying assets, such as loans, leases and receivables. Often, when the cash flows are collateralised by real estate, an ABS is called a mortgage-backed security.

**Basel II:** An accord providing a comprehensive revision of the Basel capital adequacy requirements issued by the Basel Committee on Banking Supervision (BCBS). Pillar I of the accord covers the minimum capital adequacy standards for banks, Pillar II focuses on enhancing the supervisory review process and Pillar III encourages market discipline through increased disclosure of banks' financial conditions.

**Central bank credit (liquidity) facility:** A standing credit facility which can be drawn upon by certain designated account holders (e.g. banks) at a central bank. The facility can be used automatically at the initiative of the account holder. The loans typically take the form of either advances or overdrafts on an account holder's current account which may be secured by a pledge of securities or by repurchase agreements.

**Collateralised debt obligation (CDO):** A structured debt instrument backed by the performance of a portfolio of diversified securities, loans or credit default swaps, the securitised interests in which are divided into tranches with differing streams of redemption and interest payments. When the tranches are backed by securities or loans, the structured instrument is called a "cash" CDO. Where it is backed only by loans, it is referred to as a collateralised loan obligation (CLO) and when backed by credit default swaps, it is a "synthetic" CDO.

**Collateralised loan obligation (CLO):** A CDO backed by whole commercial loans, revolving credit facilities or letters of credit.

**Combined ratio:** A financial ratio for insurers, which is calculated as the sum of the loss ratio and the expense ratio. Typically, a combined ratio of more than 100% indicates an underwriting loss for the insurer.

**Commercial mortgage-backed security (CMBS):** A security with cash flows generated by debt on property that focuses on commercial rather than residential property. Holders of such securities receive payments of interest and principal from the holders of the underlying commercial mortgage debt.

**Commercial paper:** Short-term obligations with maturities ranging from 2 to 270 days issued by banks, corporations and other borrowers. Such instruments are unsecured and usually discounted, although some are interest-bearing.

**Conduit:** A financial intermediary, such as a special-purpose vehicle (SPV) or a special investment vehicle (SIV), which funds the purchase of assets through the issuance of asset-backed securities such as commercial paper.

**Credit default swap (CDS):** A swap designed to transfer the credit exposure of fixed-income products between parties. The buyer of a credit swap receives credit protection, whereas the seller of the swap guarantees the creditworthiness of the product. By doing this, the risk of default is transferred from the holder of the fixed-income security to the seller of the swap.

**Debit balance:** The amount that an enterprise or individual owes a lender, seller or factor.

**Delinquency:** A (mortgage) debt service payment that is more than a pre-defined number of days behind schedule (typically at least 30 days late).

**Distance to default:** A measure of default risk that combines the asset value, the business risk and the leverage of an asset. The distance to default compares the market net worth to the size of a one standard deviation move in the asset value.

**Drawdown:** A measure of investment performance that refers to the cumulative percentage decline from the most recent historical performance peak.

**Earnings per share (EPS):** The amount of a company's earnings that is available per ordinary share issued. These earnings may be distributed in dividends, used to pay tax, or retained and used to expand the business. Earnings per share are a major determinant of share prices.

**EMBIG spreads:** J.P. Morgan's Emerging Markets Bond Index Global (EMBI Global) spreads. The EMBI Global tracks US dollar-denominated debt instruments issued by sovereign and quasi-sovereign entities in emerging markets, such as Brady bonds, loans and Eurobonds. It covers over 30 emerging market countries.

**Euro commercial paper (ECP):** A short-term debt instrument with a maturity of up to one year that is issued by prime issuers on the euro market, using US commercial paper as a model. Interest is accrued or paid by discounting the nominal value, and is influenced by the issuer's credit rating.

**Euro interbank offered rate (EURIBOR):** The rate at which a prime bank is willing to lend funds in euro to another prime bank. The EURIBOR is calculated daily for interbank deposits with a maturity of one week, and one to 12 months, as the average of the daily offer rates of a representative panel of prime banks, rounded to three decimal places.

**Euro overnight index average (EONIA):** A measure of the effective interest rate prevailing in the euro interbank overnight market. It is calculated as a weighted average of the interest rates on unsecured overnight lending transactions denominated in euro, as reported by a panel of contributing banks.

**Euro overnight index average (EONIA) swap index:** A reference rate for the euro on the derivatives market, i.e. the mid-market rate at which euro overnight index average (EONIA) swaps, as quoted by a representative panel of prime banks that provide quotes in the EONIA swap market, are traded. The index is calculated daily at 4.30 p.m. CET and rounded to three decimal places using an actual/360 day-count convention.

**Exchange-traded fund (ETF):** A collective investment scheme that can be traded on an organised exchange at any time in the course of the business day.

**Expected default frequency (EDF):** A measure of the probability that an enterprise will fail to meet its obligations within a specified period of time (usually the next 12 months).

**Expense ratio:** For insurers, the expense ratio denotes the ratio of expenses to the premium earned.

**Fair value accounting (FVA):** A valuation principle that stipulates the use of either a market price, where it exists, or an estimation of a market price as the present value of expected cash flows to establish the balance sheet value of financial instruments.

**Financial obligations ratio:** A financial ratio for the household sector which covers a broader range of financial obligations than the debt service ratio, including automobile lease payments, rental payments on tenant-occupied property, homeowners' insurance and property tax payments.

**Foreclosure:** The legal process through which a lender acquires possession of the property securing a mortgage loan when the borrower defaults.

**Funding liquidity:** A measure of the ease with which asset portfolios can be funded.

**High watermark:** A provision stipulating that performance fees are paid only if cumulative performance recovers any past shortfalls.

**Home equity borrowing:** Borrowing drawn against the equity in a home, calculated as the current market value less the value of the first mortgage. When originating home equity borrowing, the lending institution generally secures a second lien on the home, i.e. a claim that is subordinate to the first mortgage (if it exists).

**Household debt service ratio:** The ratio of debt payments to disposable personal income. Debt payments consist of the estimated required payments on outstanding mortgage and consumer debt.

**Implied volatility:** A measure of expected volatility (standard deviation in terms of annualised percentage changes) in the prices of e.g. bonds and stocks (or of corresponding futures contracts) that can be extracted from option prices. In general, implied volatility increases when market uncertainty rises and decreases when market uncertainty falls.

**Initial margin:** A proportion of the value of a transaction that traders have to deposit to guarantee that they will complete it. Buying shares on margin means contracting to buy them without actually paying the full cash price immediately. To safeguard the other party, a buyer is required to deposit a margin, i.e. a percentage of the price sufficient to protect the seller against loss if the buyer fails to complete the transaction.

**Interest rate swap:** A contractual agreement between two counterparties to exchange cash flows representing streams of periodic interest payments in one currency. Often, an interest rate swap involves exchanging a fixed amount per payment period for a payment that is not fixed (the floating side of the swap would usually be linked to another interest rate, often the LIBOR). Such swaps can be used by hedgers to manage their fixed or floating assets and liabilities. They can also be used by speculators to replicate unfunded bond exposures to profit from changes in interest rates.

**Investment-grade bonds:** A bond that has been given a relatively high credit rating by a major rating agency, e.g. “BBB” or above by Standard & Poor’s.

**iTraxx:** The brand name of a family of indices that cover a large part of the overall credit derivatives markets in Europe and Asia.

**Large and complex banking group (LCBG):** A banking group whose size and nature of business is such that its failure or inability to operate would most likely have adverse implications for financial intermediation, the smooth functioning of financial markets or of other financial institutions operating within the financial system.

**Leverage:** The ratio of a company’s debt to its equity, i.e. to that part of its total capital that is owned by its shareholders. High leverage means a high degree of reliance on debt financing. The higher a company’s leverage, the more of its total earnings are absorbed by paying debt interest, and the more variable are the net earnings available for distribution to shareholders.

**Leveraged buyout (LBO):** The acquisition of one company by another through the use of primarily borrowed funds, the intention being that the loans will be repaid from the cash flow generated by the acquired company.

**Leveraged loan:** A bank loan that is rated below investment grade (e.g. “BB+” and lower by Standard & Poor’s and Fitch, or “Ba1” and lower by Moody’s) to firms characterised by high leverage.

**LIBOR:** The London interbank offered rate is an index of the interest rates at which banks offer to lend unsecured funds to other banks in the London wholesale money market.

**Loss ratio:** For insurers, the loss ratio is the net sum total of the claims paid out by an insurance company or underwriting syndicate, expressed as a percentage of the sum total of the premiums paid in during the same period.

**Margin call:** A procedure related to the application of variation margins, implying that if the value, as regularly measured, of the underlying assets falls below a certain level, the (central) bank requires counterparties to supply additional assets (or cash). Similarly, if the value of the underlying assets, following their revaluation, were to exceed the amount owed by the counterparties plus the variation margin, the counterparty may ask the (central) bank to return the excess assets (or cash) to the counterparty.

**Mark to market:** The revaluation of a security, commodity, a futures or option contract or any other negotiable asset position to its current market, or realisable, value.

**Mark to model:** The pricing of a specific investment position or portfolio based on internal assumptions or financial models.

**Market liquidity:** A measure of the ease with which an asset can be traded on a given market.

**Monetary financial institution (MFI):** One of a category of financial institutions which together form the money-issuing sector of the euro area. Included are the Eurosystem, resident credit institutions (as defined in Community law) and all other resident financial institutions, the business of which is to receive deposits and/or close substitutes for deposits from entities other than MFIs and, for their own account (at least in economic terms), to grant credit and/or invest in securities. The latter group consists predominantly of money market funds.

**Mortgage-backed security (MBS):** A security with cash flows that derive from the redemption of principal and interest payments relating to a pool of mortgage loans.

**Net asset value (NAV):** The total value of fund's investments less liabilities. It is also referred to as capital under management.

**Open interest:** The total number of contracts in a commodity or options market that are still open, i.e. that have not been exercised, closed out or allowed to expire.

**Originate-to-distribute model:** A business model in which debt is generated, i.e. originated, and subsequently broken up into tranches for sale to investors, thereby spreading the risk of default among a wide group of investors.

**Overnight index swap (OIS):** An interest rate swap whereby the compounded overnight rate in the specified currency is exchanged for some fixed interest rate over a specified term.

**Price/earnings (P/E) ratio:** The ratio between the value of a corporation, as reflected in its stock price, and its annual profits. It is often calculated on the basis of the profits generated by a corporation over the previous calendar year (i.e. a four-quarter moving average of profits). For a market index such as the Standard & Poor's 500, the P/E ratio is the average of the P/E ratios of the individual corporations in that index.

**Primary market:** The market in which new issues of securities are sold or placed.

**Private equity:** Shares in privately held companies that are not listed on a public stock exchange.

**Profit and loss (P&L) statement:** The financial statement that summarises the difference between the revenues and expenses of a firm – non-financial or financial – over a given period. Such statements may be drawn up frequently for the managers of a business, but a full audited statement is normally only published for each accounting year.

**Residential mortgage-backed security (RMBS):** A security with cash flows that derive from residential debt such as mortgages and home-equity loans.

**Return on equity (ROE):** A measure of the profitability of holding (usually) ordinary shares in a company that is arrived at by dividing the company's net after-tax profit, less dividends on preference shares, by the ordinary shares outstanding.

**Risk reversal:** A specific manner of quoting similar out-of-the-money call and put options, usually foreign exchange options. Instead of quoting the prices of these options, dealers quote their volatility. The greater the demand for an options contract, the greater its volatility and its price. A positive risk reversal means that the volatility of calls is greater than the volatility of similar puts, which implies that more market participants are betting on an appreciation of the currency than on a sizeable depreciation.

**Risk-weighted asset:** An asset that is weighted by factors representing its riskiness and potential for default, i.e. in line with the concept developed by the Basel Committee on Banking Supervision (BCBS) for its capital adequacy requirements.

**Secondary market:** A market in which existing securities (i.e. issues that have already been sold or placed through an initial private or public offering) are traded.

**Securitisation:** The process of issuing new negotiable securities backed by existing assets such as loans, mortgages, credit card debt, or other assets (including accounts receivable).

**Senior debt:** Debt that has precedence over other obligations with respect to repayment if the loans made to a company are called in for repayment. Such debt is generally issued as loans of various types with different risk-return profiles, repayment conditions and maturities.

**Skewness:** A measure of data distributions that shows whether large deviations from the mean are more likely towards one side than towards the other. In the case of a symmetrical distribution, deviations either side of the mean are equally likely. Positive skewness means that large upward deviations are more likely than large downward ones. Negative skewness means that large downward deviations are more likely than large upward ones.

**Solvency ratio:** The ratio of a bank's own assets to its liabilities, i.e. a measure used to assess a bank's ability to meet its long-term obligations and thereby remain solvent. The higher the ratio, the more sound the bank.

**Sovereign wealth fund (SWF):** A special investment fund created/owned by a government to hold assets for long-term purposes; it is typically funded from reserves or other foreign-currency sources, including commodity export revenues, and predominantly has significant ownership of foreign currency claims on non-residents.

**Special-purpose vehicle (SPV):** A legal entity set up to acquire and hold certain assets on its balance sheet and to issue securities backed by those assets for sale to third parties.

**Speculative-grade bond:** A bond that has a credit rating that is not investment grade, i.e. below that determined by bank regulators to be suitable for investments, currently "Baa" (Moody's) or "BBB" (Standard & Poor's).

**Strangle:** An options strategy that involves buying a put option with a strike price below that of the underlying asset, and a call option with a strike price above that of the underlying asset (i.e. strike

prices that are both out-of-the-money). Such an options strategy is profitable only if there are large movements in the price of the underlying asset.

**Stress testing:** The estimation of credit and market valuation losses that would result from the realisation of extreme scenarios, so as to determine the stability of the financial system or entity.

**Structured credit product:** A transaction in which a bank, typically, sells a pool of loans it has originated itself to a bankruptcy-remote special-purpose vehicle (SPV), which pays for these assets by issuing tranches of a set of liabilities with different seniorities.

**Structured investment vehicle (SIV):** A special-purpose vehicle (SPV) that undertakes arbitrage activities by purchasing mostly highly rated medium and long-term, fixed-income assets and that funds itself with cheaper, mostly short-term, highly rated commercial paper and medium-term notes (MTNs). While there are a number of costs associated with running a structured investment vehicle, these are balanced by economic incentives: the creation of net spread to pay subordinated noteholder returns and the creation of management fee income. Vehicles sponsored by financial institutions also have the incentive to create off-balance-sheet fund management structures with products that can be fed to existing and new clients by way of investment in the capital notes of the vehicle.

**Subordinated debt:** A debt that can only be claimed by an unsecured creditor, in the event of a liquidation, after the claims of secured creditors have been met, i.e. the rights of the holders of the stock of debt are subordinate to the interests of depositors. Debts involving speculative-grade bonds are always subordinated to debts vis-à-vis banks, irrespective of whether or not they are secured.

**Subordination:** A mechanism to protect higher-rated tranches against shortfalls in cash flows from underlying collateral provided in the form of residential mortgage-backed securities (RMBSs), by way of which losses from defaults of the underlying mortgages are applied to junior tranches before they are applied to more senior tranches. Only once a junior tranche is completely exhausted will defaults impair the next tranche. Consequently, the most senior tranches are extremely secure against credit risk, are rated “AAA”, and trade at lower spreads.

**Sub-prime borrower:** A borrower with a poor credit history and/or insufficient collateral who does not, as a consequence thereof, qualify for a conventional loan and can borrow only from lenders that specialise in dealing with such borrowers. The interest rates charged on loans to such borrowers include a risk premium, so that it is offered at a rate above prime to individuals who do not qualify for prime rate loans.

**TARGET (Trans-European Automated Real-time Gross settlement Express Transfer system):** A payment system comprising a number of national real-time gross settlement (RTGS) systems and the ECB payment mechanism (EPM). The national RTGS systems and the EPM are interconnected by common procedures (interlinking) to provide a mechanism for the processing of euro payments throughout the euro area and some non-euro area EU Member States.

**TARGET2:** New generation of TARGET, designed to offer a harmonised level of service on the basis of a single technical platform, through which all payment transactions are submitted and processed in the same technical manner.

**Term auction facility (TAF):** A form of central bank credit (liquidity) facility.

**Tier 1 capital:** Equity represented by ordinary shares and retained profit or earnings plus qualifying non-cumulative preference shares (up to a maximum of 25% of total Tier 1 capital) plus minority interests in equity accounts of consolidated subsidiaries. The level of Tier 1 capital is a measure of the capital adequacy of a bank, which is calculated as the ratio of a bank's core equity capital to its total risk-weighted assets.

**Tier 2 capital:** The second most reliable form of financial capital, from a regulator's point of view, that is also used as a measure of a bank's financial strength. It includes, according to the concept developed by the Basel Committee on Banking Supervision (BCBS) for its capital adequacy requirements, undisclosed reserves, revaluation reserves, general provisions, hybrid instruments and subordinated term debt.

**Triggers of net asset value (NAV) cumulative decline:** Triggers of total NAV or NAV-per-share cumulative decline represent contractual termination events which allow counterparties to terminate transactions and seize the collateral held.

**Value at risk (VaR):** A risk measure of a portfolio's maximum loss during a specific period of time at a given level of probability.

**Variation margin:** In margin deposit trading, these are the funds required to be deposited by an investor when a price movement has caused funds to fall below the initial margin requirement. Conversely, funds may be withdrawn by an investor when a price movement has caused funds to rise above the margin requirement.

**Write-down:** An adjustment to the value of loans recorded on the balance sheets of financial institutions. A loan is written down when it is recognised as having become partly unrecoverable, and its value on the balance sheet is reduced accordingly.

**Write-off:** An adjustment to the value of loans recorded on the balance sheets of financial institutions. A loan is written off when it is considered to be totally unrecoverable, and is removed from the balance sheet.

**Yield curve:** A curve describing the relationship between the interest rate or yield and the maturity at a given point in time for debt securities with the same credit risk but different maturity dates. The slope of the yield curve can be measured as the difference between the interest rates at two selected maturities.

# STATISTICAL ANNEX

## STATISTICAL ANNEX

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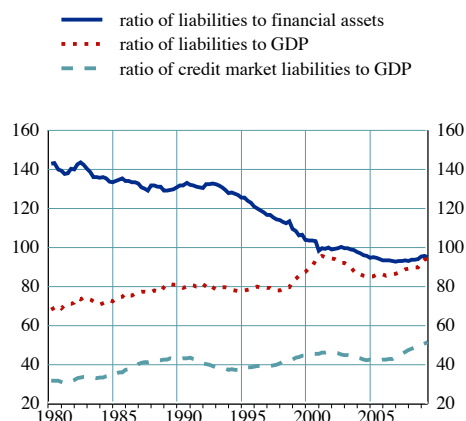
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# I EXTERNAL ENVIRONMENT

**Chart S1 US non-farm, non-financial corporate sector business liabilities**

(Q1 1980 - Q2 2009; percentage)



Sources: Thomson Reuters Datastream, Bank for International Settlements (BIS), Eurostat and ECB calculations.

**Chart S2 US non-farm, non-financial corporate sector business net equity issuance**

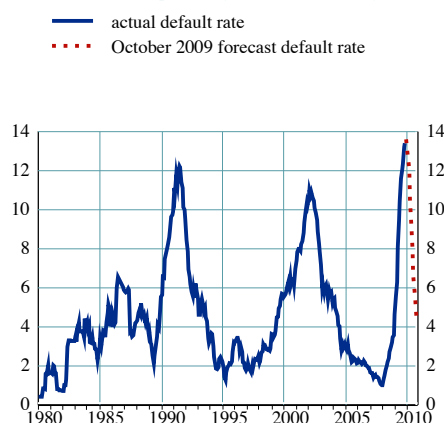
(Q1 1980 - Q2 2009; USD billions; seasonally adjusted and annualised quarterly data)



Source: BIS.

**Chart S3 US speculative-grade corporations' actual and forecast default rates**

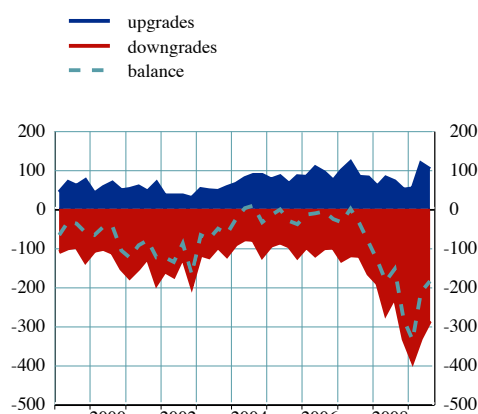
(Jan. 1980 - Oct. 2010; percentage; 12-month trailing sum)



Source: Moody's.

**Chart S4 US corporate sector rating changes**

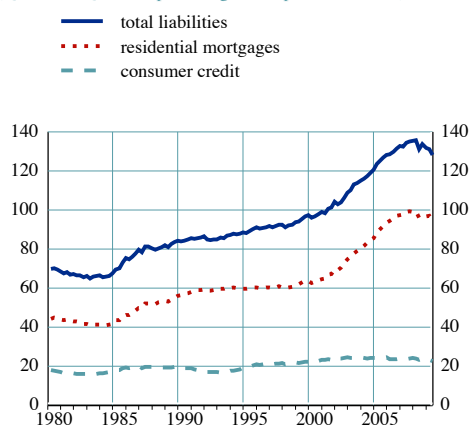
(Q1 1999 - Q3 2009; number)



Sources: Moody's and ECB calculations.

**Chart S5 US household sector debt**

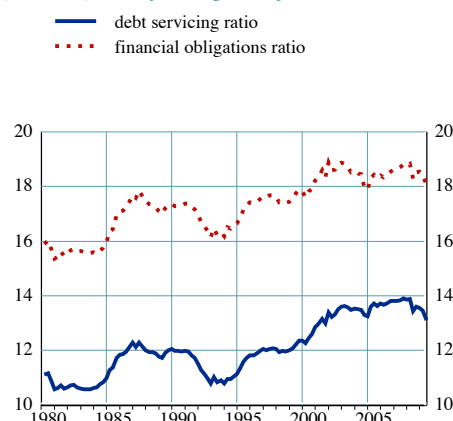
(Q1 1980 - Q2 2009; percentage of disposable income)



Sources: Thomson Reuters Datastream, BIS and ECB calculations.

**Chart S6 US household sector debt burden**

(Q1 1980 - Q2 2009; percentage of disposable income)

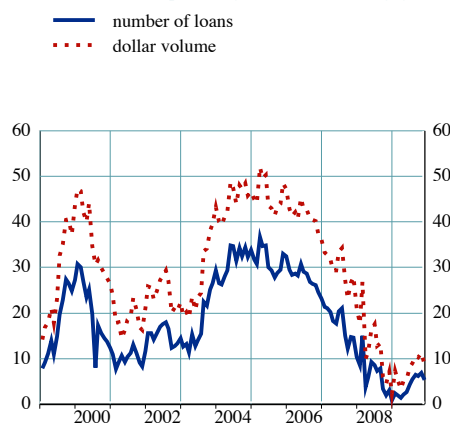


Source: Thomson Reuters Datastream.

Notes: The debt servicing ratio represents the amount of debt payments as a percentage of disposable income. The financial obligations ratio also includes automobile lease payments, rental payments on tenant-occupied property, homeowners' insurance and property tax payments.

**Chart S7 Share of adjustable-rate mortgages in the United States**

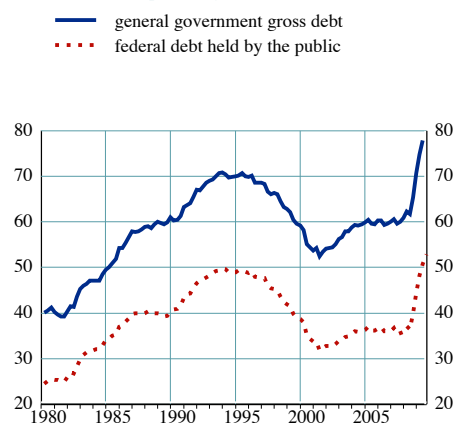
(Jan. 1999 - Nov. 2009; percentage of total new mortgages)



Source: Thomson Reuters Datastream.

**Chart S8 US general government and federal debt**

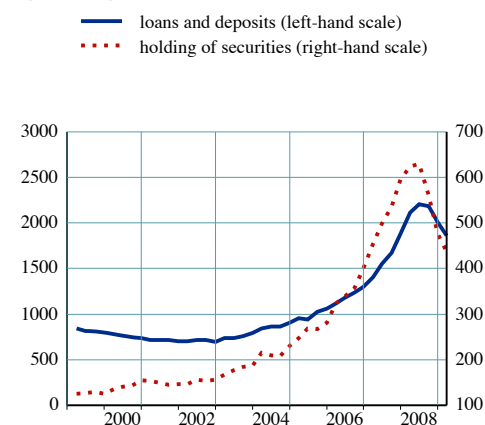
(Q1 1980 - Q3 2009; percentage of GDP)



Sources: Board of Governors of the Federal Reserve System, Eurostat, Thomson Reuters Datastream and ECB calculations.  
Note: General government gross debt comprises federal, state and local government gross debt.

**Chart S9 International positions of all BIS reporting banks vis-à-vis emerging markets**

(Q1 1999 - Q1 2009; USD billions)



Sources: BIS and ECB calculations.

**Table S1 Financial vulnerability indicators for selected emerging market economies**

|                        | Real GDP growth<br>(% change per annum) |       |      | Inflation<br>(% change per annum) |      |      | General government<br>fiscal balances and debt<br>(% of GDP) |       |       | Current account balance<br>(% of GDP) |      |      |
|------------------------|-----------------------------------------|-------|------|-----------------------------------|------|------|--------------------------------------------------------------|-------|-------|---------------------------------------|------|------|
|                        | 2008                                    | 2009  | 2010 | 2008                              | 2009 | 2010 | 2008                                                         | 2009  | 2010  | 2008                                  | 2009 | 2010 |
| <b>Asia</b>            |                                         |       |      |                                   |      |      |                                                              |       |       |                                       |      |      |
| China                  | 9.0                                     | 8.5   | 9.0  | 2.8                               | 0.8  | 0.6  | -0.1                                                         | -2.0  | -2.0  | 9.8                                   | 7.8  | 8.6  |
| Hong Kong              | 2.4                                     | -3.6  | 3.5  | 2.0                               | -2.8 | 0.5  | 0.1                                                          | -3.4  | -1.5  | 14.2                                  | 10.7 | 10.8 |
| India                  | 7.3                                     | 5.4   | 6.4  | 9.7                               | 8.9  | 7.4  | -7.9                                                         | -10.4 | -10.0 | -2.2                                  | -2.2 | -2.5 |
| Indonesia              | 6.1                                     | 4.0   | 4.8  | 11.1                              | 4.0  | 6.0  | 0.0                                                          | -2.6  | -2.1  | 0.1                                   | 0.9  | 0.5  |
| Korea                  | 2.2                                     | -1.0  | 3.6  | 4.1                               | 2.0  | 3.0  | 1.2                                                          | -2.8  | -2.7  | -0.7                                  | 3.4  | 2.2  |
| Malaysia               | 4.6                                     | -3.6  | 2.5  | 4.3                               | 1.2  | 1.2  | -4.4                                                         | -4.8  | -3.6  | 17.9                                  | 13.4 | 11.0 |
| Singapore              | 1.1                                     | -3.3  | 4.1  | 5.4                               | -1.3 | 2.0  | 6.3                                                          | 2.5   | 2.4   | 14.8                                  | 12.6 | 12.5 |
| Taiwan                 | 0.1                                     | -4.1  | 3.7  | 3.8                               | -0.1 | 1.3  | -0.8                                                         | -4.3  | -3.3  | 6.4                                   | 7.9  | 8.0  |
| Thailand               | 2.6                                     | -3.5  | 3.7  | 0.4                               | 2.4  | 1.2  | 0.1                                                          | -4.1  | -2.6  | -0.1                                  | 4.9  | 2.7  |
| <b>Emerging Europe</b> |                                         |       |      |                                   |      |      |                                                              |       |       |                                       |      |      |
| Russia                 | 5.6                                     | -7.5  | 1.5  | 13.3                              | 11.0 | 9.0  | 4.3                                                          | -6.6  | -3.2  | 6.1                                   | 3.6  | 4.5  |
| Turkey                 | 0.9                                     | -6.5  | 3.7  | 10.1                              | 5.8  | 6.3  | -2.8                                                         | -7.0  | -5.3  | -5.7                                  | -1.9 | -3.7 |
| Ukraine                | 2.1                                     | -14.0 | 2.7  | 22.3                              | 14.0 | 9.0  | -3.2                                                         | -6.0  | -3.0  | -7.2                                  | 0.4  | 0.2  |
| <b>Latin America</b>   |                                         |       |      |                                   |      |      |                                                              |       |       |                                       |      |      |
| Argentina              | 6.8                                     | -2.5  | 1.5  | 7.2                               | 5.0  | 5.0  | -0.1                                                         | -3.9  | -2.4  | 1.4                                   | 4.4  | 4.9  |
| Brazil                 | 5.1                                     | -0.7  | 3.5  | 5.9                               | 4.2  | 4.4  | -1.5                                                         | -3.8  | -1.2  | -1.8                                  | -1.3 | -1.9 |
| Chile                  | 3.2                                     | -1.7  | 4.0  | 7.6                               | -0.5 | 2.5  | 5.4                                                          | -4.2  | -1.2  | -2.0                                  | 0.7  | -0.4 |
| Colombia               | 2.5                                     | -0.3  | 2.5  | 7.7                               | 3.8  | 3.6  | 0.1                                                          | -2.9  | -3.3  | -2.8                                  | -2.9 | -3.1 |
| Mexico                 | 1.3                                     | -7.3  | 3.3  | 6.5                               | 4.3  | 3.2  | -1.8                                                         | -4.9  | -4.0  | -1.4                                  | -1.2 | -1.3 |
| Venezuela              | 4.8                                     | -2.0  | -0.4 | 30.9                              | 28.0 | 32.0 | -2.6                                                         | -7.0  | -5.4  | 12.3                                  | 1.8  | 5.4  |

Source: International Monetary Fund (IMF).

Notes: Data for 2009 and 2010 are forecasts. In the case of current account balance for Brazil, the data for 2008 are forecasts.

**Table S2 Financial condition of global large and complex banking groups**

(2004 - H1 2009)

|                                                        | Minimum | First quartile | Median | Average | Weighted average <sup>1)</sup> | Third quartile | Maximum |
|--------------------------------------------------------|---------|----------------|--------|---------|--------------------------------|----------------|---------|
| <b>Return on shareholders' equity (%)</b>              |         |                |        |         |                                |                |         |
| 2004                                                   | 4.24    | 14.26          | 15.50  | 15.56   | 13.99                          | 18.15          | 21.71   |
| 2005                                                   | 7.92    | 15.91          | 16.32  | 18.56   | 17.36                          | 21.43          | 33.68   |
| 2006                                                   | 12.47   | 15.25          | 21.75  | 20.12   | 17.73                          | 24.03          | 29.18   |
| 2007                                                   | -13.48  | 10.52          | 12.47  | 12.57   | 12.02                          | 17.02          | 29.22   |
| 2008                                                   | -64.80  | -25.19         | 4.85   | -8.30   | -8.64                          | 6.12           | 16.63   |
| 2009 H1                                                | -44.72  | -0.15          | 6.63   | 4.63    | 7.98                           | 15.06          | 38.52   |
| <b>Return on risk-weighted assets (%)</b>              |         |                |        |         |                                |                |         |
| 2004                                                   | 0.56    | 1.51           | 1.74   | 1.74    | 1.56                           | 2.00           | 2.78    |
| 2005                                                   | 1.00    | 1.54           | 1.82   | 2.15    | 1.96                           | 2.65           | 4.78    |
| 2006                                                   | 1.45    | 1.54           | 1.86   | 2.37    | 1.91                           | 3.49           | 4.35    |
| 2007                                                   | -1.33   | 0.93           | 1.46   | 1.20    | 1.00                           | 1.82           | 2.36    |
| 2008                                                   | -6.97   | -2.78          | 0.50   | -0.70   | -0.83                          | 0.61           | 2.60    |
| 2009 H1                                                | -7.32   | -0.02          | 0.84   | 0.28    | 0.87                           | 1.30           | 2.92    |
| <b>Total operating income (% of total assets)</b>      |         |                |        |         |                                |                |         |
| 2004                                                   | 2.36    | 3.43           | 3.94   | 4.12    | 3.84                           | 4.56           | 6.70    |
| 2005                                                   | 2.07    | 3.08           | 3.89   | 3.88    | 3.56                           | 4.48           | 5.91    |
| 2006                                                   | 2.08    | 2.73           | 3.72   | 3.91    | 3.46                           | 4.76           | 6.63    |
| 2007                                                   | 1.41    | 2.68           | 3.54   | 3.45    | 2.85                           | 4.11           | 5.85    |
| 2008                                                   | 0.38    | 1.50           | 3.08   | 2.97    | 2.32                           | 3.76           | 6.16    |
| 2009 H1                                                | 1.72    | 1.89           | 3.14   | 3.73    | 3.37                           | 5.21           | 6.08    |
| <b>Net income (% of total assets)</b>                  |         |                |        |         |                                |                |         |
| 2004                                                   | 0.39    | 0.58           | 0.83   | 0.83    | 0.77                           | 1.01           | 1.52    |
| 2005                                                   | 0.39    | 0.71           | 0.80   | 0.89    | 0.86                           | 1.00           | 1.65    |
| 2006                                                   | 0.43    | 0.67           | 0.88   | 1.03    | 0.86                           | 1.14           | 2.76    |
| 2007                                                   | -0.22   | 0.36           | 0.81   | 0.63    | 0.51                           | 0.94           | 1.04    |
| 2008                                                   | -1.43   | -0.70          | 0.24   | -0.08   | -0.32                          | 0.26           | 1.04    |
| 2009 H1                                                | -3.53   | -0.01          | 0.48   | 0.16    | 0.37                           | 0.66           | 1.21    |
| <b>Net loan impairment charges (% of total assets)</b> |         |                |        |         |                                |                |         |
| 2004                                                   | -0.02   | 0.01           | 0.15   | 0.16    | 0.21                           | 0.25           | 0.48    |
| 2005                                                   | -0.02   | 0.00           | 0.18   | 0.20    | 0.24                           | 0.31           | 0.53    |
| 2006                                                   | -0.02   | 0.00           | 0.20   | 0.18    | 0.22                           | 0.34           | 0.57    |
| 2007                                                   | -0.01   | 0.00           | 0.11   | 0.25    | 0.31                           | 0.49           | 0.77    |
| 2008                                                   | 0.00    | 0.06           | 0.34   | 0.54    | 0.69                           | 0.96           | 1.74    |
| 2009 H1                                                | 0.00    | 0.12           | 0.53   | 0.83    | 1.11                           | 1.37           | 2.40    |
| <b>Cost-to-income ratio (%)</b>                        |         |                |        |         |                                |                |         |
| 2004                                                   | 50.79   | 53.68          | 64.75  | 63.32   | 61.21                          | 67.75          | 84.33   |
| 2005                                                   | 48.73   | 53.48          | 65.71  | 62.31   | 59.27                          | 69.95          | 75.39   |
| 2006                                                   | 46.87   | 52.87          | 60.42  | 59.75   | 57.62                          | 66.79          | 71.60   |
| 2007                                                   | 49.43   | 57.39          | 59.28  | 66.56   | 63.55                          | 70.96          | 111.32  |
| 2008                                                   | 48.63   | 62.18          | 79.85  | 138.13  | 85.34                          | 95.25          | 745.61  |
| 2009 H1                                                | 31.95   | 52.12          | 63.03  | 66.18   | 29.26                          | 76.92          | 119.22  |
| <b>Tier 1 ratio (%)</b>                                |         |                |        |         |                                |                |         |
| 2004                                                   | 7.00    | 8.20           | 8.70   | 9.38    | 8.56                           | 10.40          | 13.30   |
| 2005                                                   | 6.90    | 8.08           | 8.50   | 9.19    | 8.69                           | 10.15          | 12.80   |
| 2006                                                   | 7.50    | 8.20           | 8.64   | 9.67    | 8.90                           | 10.65          | 13.90   |
| 2007                                                   | 6.87    | 7.55           | 8.40   | 8.69    | 7.85                           | 9.31           | 11.20   |
| 2008                                                   | 8.00    | 9.15           | 11.00  | 12.17   | 10.65                          | 13.30          | 20.30   |
| 2009 H1                                                | 7.00    | 10.10          | 12.50  | 11.99   | 10.89                          | 13.80          | 15.80   |
| <b>Overall solvency ratio (%)</b>                      |         |                |        |         |                                |                |         |
| 2004                                                   | 10.10   | 11.72          | 12.00  | 12.58   | 11.92                          | 13.01          | 16.60   |
| 2005                                                   | 10.90   | 11.45          | 12.02  | 12.36   | 12.17                          | 13.25          | 14.10   |
| 2006                                                   | 10.70   | 11.70          | 12.30  | 13.17   | 12.54                          | 14.10          | 18.40   |
| 2007                                                   | 10.70   | 11.11          | 12.20  | 12.26   | 11.79                          | 12.98          | 14.50   |
| 2008                                                   | 11.20   | 13.60          | 15.00  | 16.24   | 14.65                          | 17.90          | 26.80   |
| 2009 H1                                                | 10.60   | 13.35          | 16.00  | 15.48   | 14.54                          | 17.15          | 20.00   |

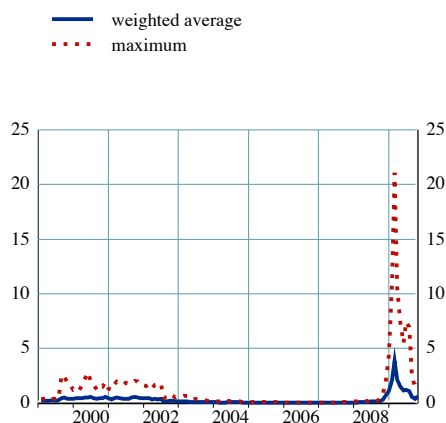
Sources: Bloomberg, individual institutions' financial reports and ECB calculations.

Notes: Based on available figures for 13 global large and complex banking groups. Figures for H1 2009 are annualised.

1) The respective denominators are used as weights, i.e. the total operating income is used in the case of the "Cost-to-income ratio", while the risk-weighted assets are used for the "Tier 1 ratio" and the "Overall solvency ratio".

**Chart S10 Expected default frequency (EDF) for global large and complex banking groups**

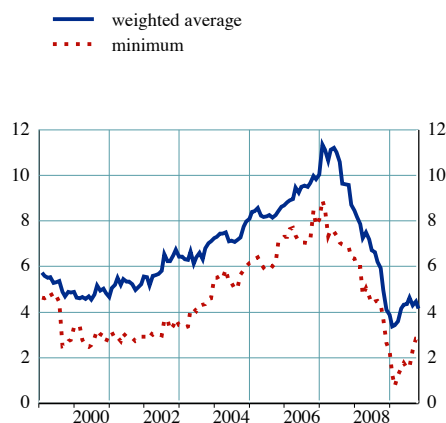
(Jan. 1999 - Oct. 2009; percentage probability)



Sources: Moody's KMV and ECB calculations.  
Note: The EDF provides an estimate of the probability of default over the following year. Due to measurement considerations, the EDF values are restricted by Moody's KMV to the interval between 0.01% and 35%.

**Chart S11 Distance-to-default for global large and complex banking groups**

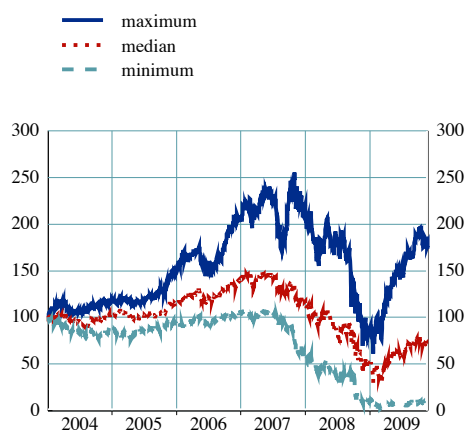
(Jan. 1999 - Oct. 2009)



Sources: Moody's KMV and ECB calculations.  
Note: An increase in the distance-to-default reflects an improving assessment.

**Chart S12 Equity prices for global large and complex banking groups**

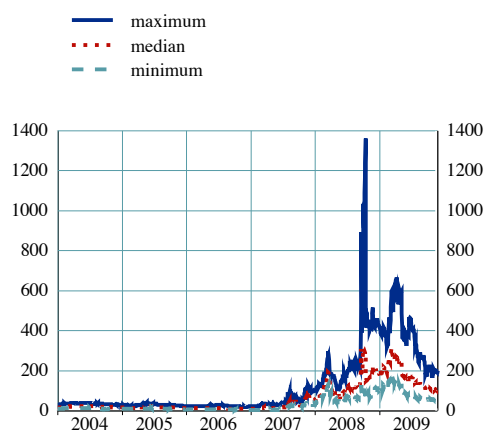
(Jan. 2004 - Nov. 2009; index: Jan. 2004=100)



Sources: Bloomberg and ECB calculations.

**Chart S13 Credit default swap spreads for global large and complex banking groups**

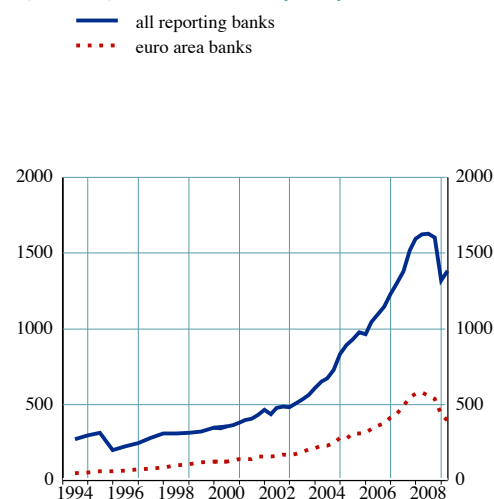
(Jan. 2004 - Nov. 2009; basis points; senior debt five-year maturity)



Sources: Bloomberg and ECB calculations.

**Chart S14 Global consolidated claims on non-banks in offshore financial centres**

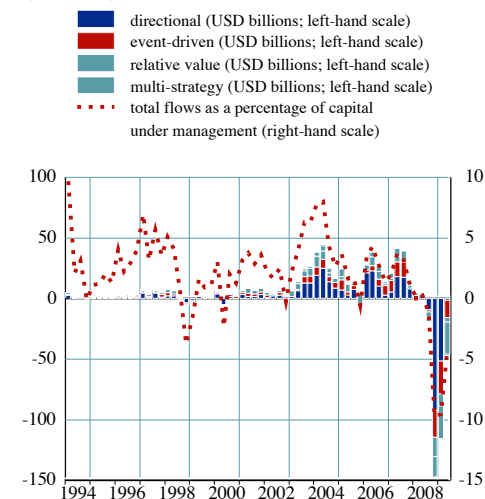
(Q1 1994 - Q1 2009; USD billions; quarterly data)



Source: BIS and ECB calculations.  
Note: Aggregate for euro area banks derived as the sum of claims on non-banks in offshore financial centres of euro area 12 countries (i.e. euro area excluding Cyprus, Malta, Slovakia and Slovenia).

**Chart S15 Global hedge fund net flows**

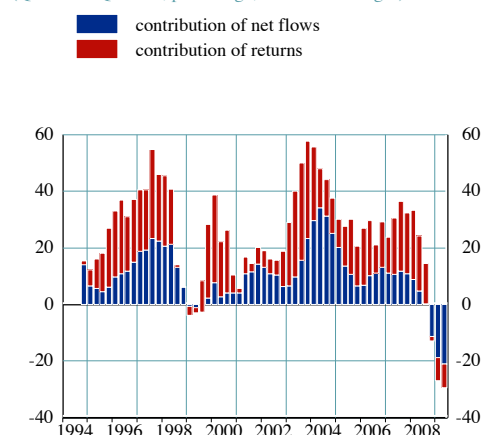
(Q1 1994 - Q2 2009)



Sources: Lipper TASS and ECB calculations.  
Notes: Excluding funds of hedge funds. The directional group includes long/short equity hedge, global macro, emerging markets, dedicated short-bias and managed futures strategies. The relative-value group consists of convertible arbitrage, fixed income arbitrage and equity market-neutral strategies.

**Chart S16 Decomposition of the annual rate of growth of global hedge fund capital under management**

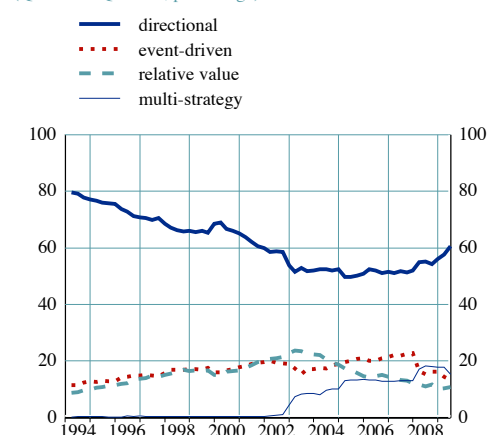
(Q4 1994 - Q2 2009; percentage; 12-month changes)



Sources: Lipper TASS and ECB calculations.  
Notes: Excluding funds of hedge funds. The estimated quarterly return to investors equals the difference between the change in capital under management and net flows. In this dataset, capital under management totalled USD 1.2 trillion at the end of December 2008.

**Chart S17 Structure of global hedge fund capital under management**

(Q1 1994 - Q2 2009; percentage)

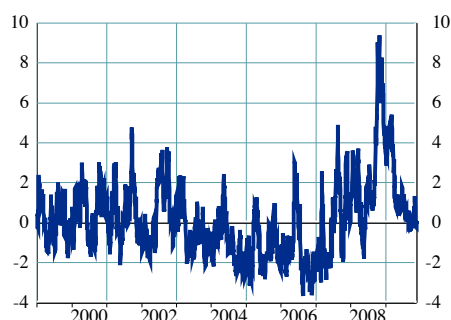


Sources: Lipper TASS and ECB calculations.  
Notes: Excluding funds of hedge funds. The directional group includes long/short equity hedge, global macro, emerging markets, dedicated short-bias and managed futures strategies. The relative-value group consists of convertible arbitrage, fixed income arbitrage and equity market-neutral strategies.

## 2 INTERNATIONAL FINANCIAL MARKETS

**Chart S18 Global risk aversion indicator**

(Jan. 1999 - Nov. 2009)



Sources: Bloomberg, Bank of America Merrill Lynch, UBS, Commerzbank and ECB calculations.  
Notes: The indicator is constructed as the first principal component of six risk aversion indicators available at weekly frequency. 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 2007.

**Chart S19 Real broad USD effective exchange rate index**

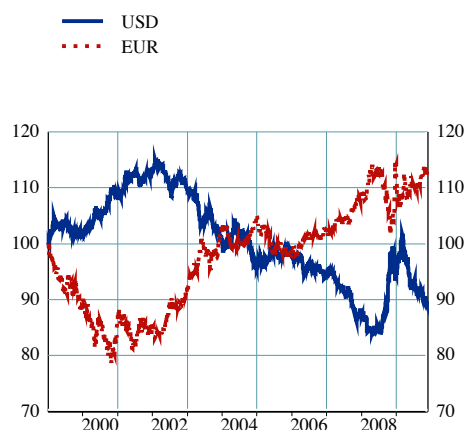
(Jan. 1999 - Nov. 2009; index: Jan. 1999=100)



Source: Thomson Reuters Datastream.  
Notes: Weighted average of the foreign exchange values of the US dollar against the currencies of a large group of major US trading partners, deflated by the US consumer price index. For further details, see "Indexes of the foreign exchange value of the dollar", *Federal Reserve Bulletin*, Winter 2005.

**Chart S20 Selected nominal effective exchange rate indices**

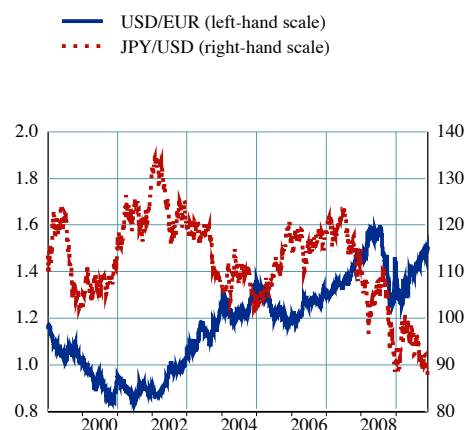
(Jan. 1999 - Nov. 2009; index: Jan. 1999=100)



Sources: Bloomberg and ECB.  
Notes: Weighted averages of bilateral exchange rates against major trading partners of the euro area and the United States. For further details in the case of the euro area, see ECB, "The effective exchange rates of the euro", *Occasional Paper Series*, No 2, February 2002. For the United States see the note of Chart S19.

**Chart S21 Selected bilateral exchange rates**

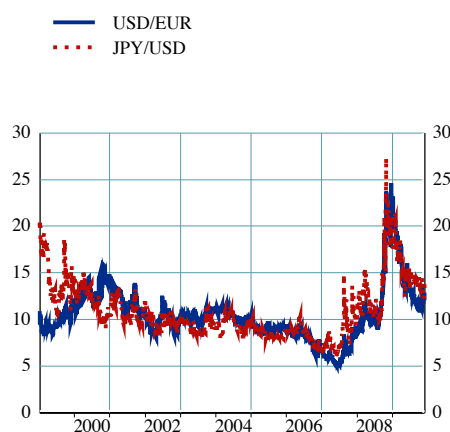
(Jan. 1999 - Nov. 2009)



Source: ECB.

**Chart S22 Selected three-month implied foreign exchange market volatility**

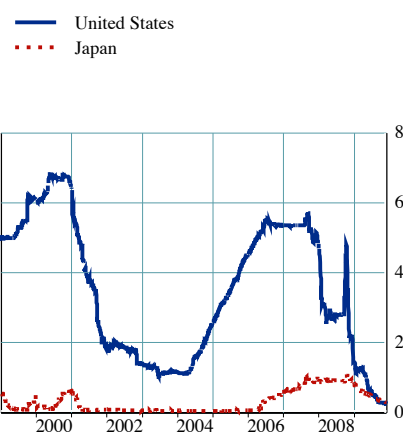
(Jan. 1999 - Nov. 2009; percentage)



Source: Bloomberg.

**Chart S23 Three-month money market rates in the United States and Japan**

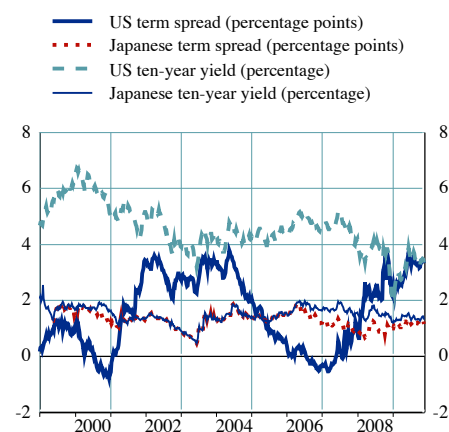
(Jan. 1999 - Nov. 2009; percentage)



Source: Thomson Reuters.  
Note: US Dollar and Japanese Yen 3-month LIBOR.

**Chart S24 Government bond yields and term spreads in the United States and Japan**

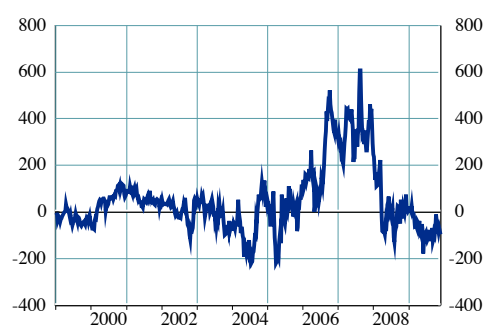
(Jan. 1999 - Nov. 2009)



Sources: Bloomberg, Thomson Reuters and ECB calculations.  
Note: The term spread is the difference between the yield on ten-year bonds and that on three month T-bills.

**Chart S25 Net non-commercial positions in ten-year US Treasury futures**

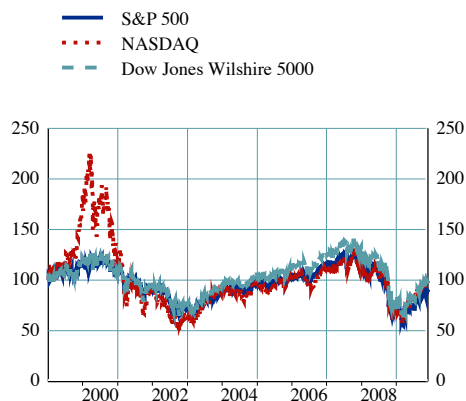
(Jan. 1999 - Nov. 2009; thousands of contracts)



Sources: Bloomberg and ECB calculations.  
Notes: Futures traded on the Chicago Board of Trade.  
Non-commercial futures contracts are contracts bought for purposes other than hedging.

**Chart S26 Stock prices in the United States**

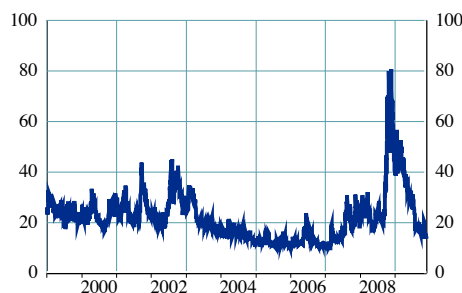
(Jan. 1999 - Nov. 2009; index: Jan. 1999=100)



Sources: Bloomberg, Thomson Reuters and ECB calculations.

**Chart S27 Implied volatility for the S&P 500 index**

(Jan. 1999 - Nov. 2009; percentage; CBOE Volatility Index (VIX))

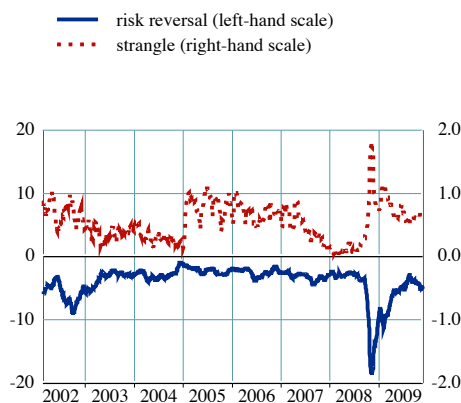


Source: Thomson Reuters Datastream.

Note: Data calculated by the Chicago Board Options Exchange (CBOE) as a weighted average of the closest options.

**Chart S28 Risk reversal and strangle of the S&P 500 index**

(Feb. 2002 - Nov. 2009; percentage; implied volatility; 20-day moving average)



Sources: Bloomberg and ECB calculations.

Notes: The risk-reversal indicator is calculated as the difference between the implied volatility of an out-of-the-money (OTM) call with 25 delta and the implied volatility of an OTM put with 25 delta. The strangle is calculated as the difference between the average implied volatility of OTM calls and puts, both with 25 delta, and the at-the-money volatility of calls and puts with 50 delta.

**Chart S29 Price/earnings (P/E) ratio for the US stock market**

(Jan. 1985 - Oct. 2009; percentage; ten-year trailing earnings)

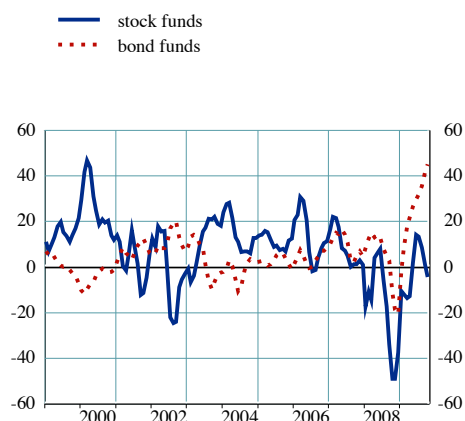


Sources: Thomson Reuters Datastream and ECB calculations.

Note: The P/E ratio is based on prevailing stock prices relative to an average of the previous ten years of earnings.

**Chart S30 US mutual fund flows**

(Jan. 1999 - Oct. 2009; USD billions; three-month moving average)



Source: Thomson Reuters Datastream.

**Chart S31 Debit balances in New York Stock Exchange margin accounts**

(Jan. 1999 - Oct. 2009; USD billions)

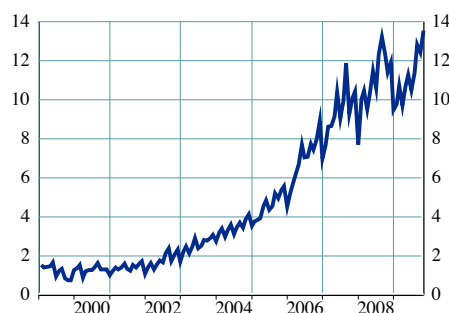


Source: Bloomberg.

Note: Borrowing to buy stocks “on margin” allows investors to use loans to pay for up to 50% of the price of a stock.

**Chart S32 Open interest in options contracts on the S&P 500 index**

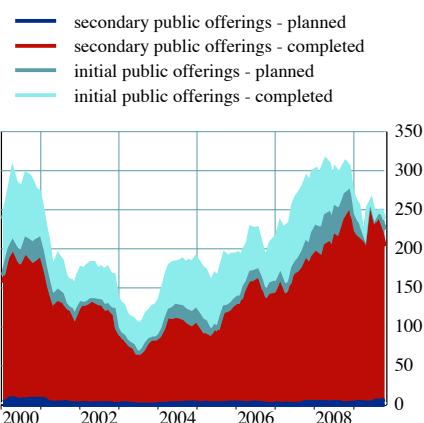
(Jan. 1999 - Oct. 2009; millions of contracts)



Source: Bloomberg.

**Chart S33 Gross equity issuance in the United States**

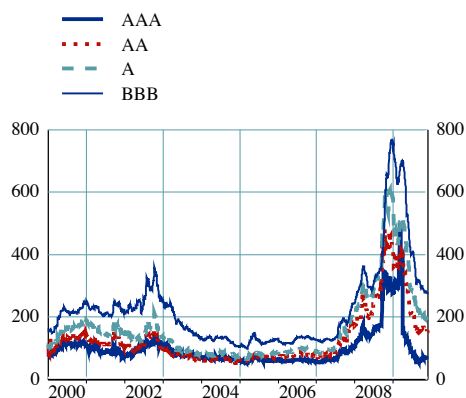
(Jan. 2000 - Oct. 2009; USD billions)



Source: Thomson ONE Banker.

**Chart S34 US investment-grade corporate bond spreads**

(Jan. 2000 - Nov. 2009; basis points)



Source: Merrill Lynch.

Note: Options-adjusted spread of the seven to ten-year corporate bond indices.

**Chart S35 US speculative-grade corporate bond spreads**

(Jan. 2000 - Nov. 2009; basis points)

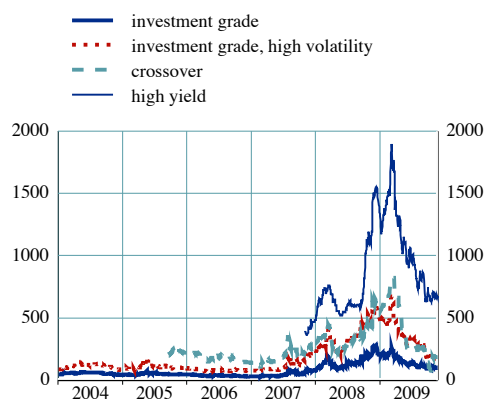


Source: Merrill Lynch.

Note: Options-adjusted spread of the US domestic high-yield index (average rating B, average maturity of seven years).

**Chart S36 US credit default swap indices**

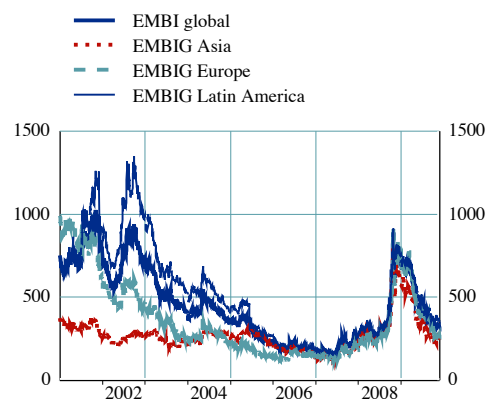
(Jan. 2004 - Nov. 2009; basis points; five year maturity)



Sources: Bloomberg and ECB calculations.

**Chart S37 Emerging market sovereign bond spreads**

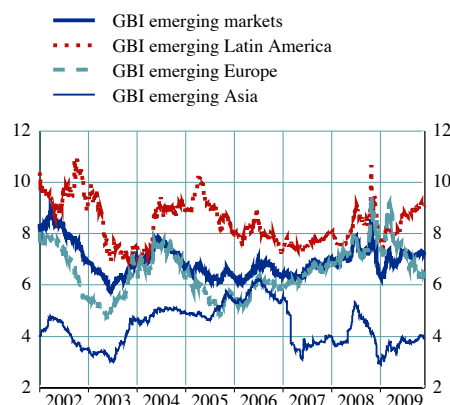
(Jan. 2001 - Nov. 2009; basis points)



Source: Bloomberg and ECB calculations.

**Chart S38 Emerging market sovereign bond yields, local currency**

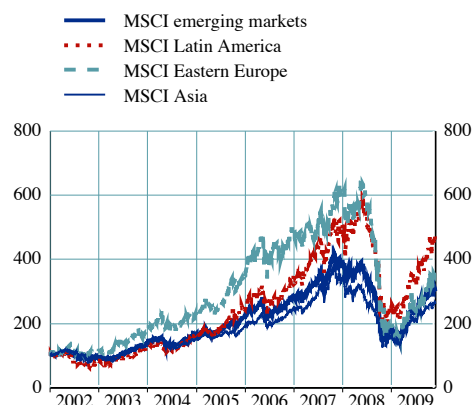
(Jan. 2002 - Nov. 2009; percentage)



Source: Bloomberg.  
Note: GBI stands for "Government Bond Index".

**Chart S39 Emerging market stock price indices**

(Jan. 2002 - Nov. 2009; index: Jan. 2002=100)



Sources: Bloomberg and ECB calculations.  
Note: MSCI stands for "Morgan Stanley Capital International".

**Table S3 Total international bond issuance (private and public) in selected emerging markets**

(USD millions)

|                        | 2002          | 2003          | 2004          | 2005          | 2006          | 2007          | 2008          | 2009          |
|------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>Asia</b>            | <b>21,245</b> | <b>32,257</b> | <b>63,256</b> | <b>47,968</b> | <b>45,848</b> | <b>66,582</b> | <b>43,803</b> | <b>33,745</b> |
| <i>of which</i>        |               |               |               |               |               |               |               |               |
| China                  | 190           | 1,781         | 4,484         | 5,830         | 1,945         | 2,196         | 5,000         | 4,400         |
| Hong Kong              | 2,300         | 11,350        | 7,680         | 6,500         | 2,500         | 2,000         | 1,500         | 1,000         |
| India                  | 100           | 1,558         | 6,529         | 5,069         | 4,854         | 13,673        | 5,500         | 4,500         |
| Indonesia              | 450           | 500           | 1,540         | 4,456         | 4,603         | 4,408         | 3,400         | 3,300         |
| Malaysia               | 3,838         | 907           | 4,132         | 2,765         | 1,620         | 0             | 2,321         | 1,450         |
| Singapore              | 1,585         | 1,355         | 1,841         | 1,948         | 2,293         | 2,401         | 1,300         | 600           |
| South Korea            | 5,250         | 6,750         | 26,000        | 15,250        | 20,800        | 39,111        | 20,600        | 15,205        |
| Taiwan                 | 3,975         | 4,692         | 4,962         | 530           | 1,050         | 980           | 1,030         | 870           |
| Thailand               | 48            | 300           | 1,400         | 2,236         | 935           | 765           | 752           | 370           |
| <b>Emerging Europe</b> | <b>8,041</b>  | <b>11,100</b> | <b>19,952</b> | <b>25,242</b> | <b>30,014</b> | <b>58,976</b> | <b>35,750</b> | <b>14,700</b> |
| <i>of which</i>        |               |               |               |               |               |               |               |               |
| Russia                 | 3,493         | 6,686         | 10,140        | 15,620        | 21,342        | 46,284        | 27,000        | 8,000         |
| Turkey                 | 3,352         | 3,417         | 6,439         | 8,355         | 7,236         | 7,413         | 6,500         | 5,500         |
| Ukraine                | 399           | 0             | 1,457         | 1,197         | 962           | 4,525         | 2,000         | 200           |
| <b>Latin America</b>   | <b>20,281</b> | <b>33,884</b> | <b>35,143</b> | <b>41,315</b> | <b>36,253</b> | <b>40,219</b> | <b>43,067</b> | <b>31,750</b> |
| <i>of which</i>        |               |               |               |               |               |               |               |               |
| Argentina              | 0             | 0             | 918           | 2,734         | 3,123         | 5,387         | 3,700         | 250           |
| Brazil                 | 6,827         | 13,160        | 10,943        | 14,831        | 15,446        | 16,907        | 11,000        | 9,500         |
| Chile                  | 1,708         | 2,130         | 2,375         | 1,200         | 1,463         | 250           | 920           | 1,300         |
| Colombia               | 500           | 2,047         | 1,545         | 2,304         | 2,866         | 1,762         | 1,000         | 4,000         |
| Mexico                 | 6,871         | 10,181        | 12,024        | 8,804         | 7,769         | 9,093         | 17,000        | 9,000         |
| Venezuela              | 212           | 3,763         | 4,260         | 6,143         | 100           | 1,250         | 8,000         | 6,000         |

Source: Thomson Financial Datastream.

Notes: Data for 2008 and 2009 are forecasts. Series include gross public and private placements of bonds denominated in foreign currency and held by non-residents. Bonds issued in the context of debt restructuring operations are not included. Regions are defined as follows: Asia: China, Special Administrative Region of Hong Kong, India, Indonesia, Malaysia, South Korea, the Philippines, Singapore, Taiwan, Thailand and Vietnam; Emerging Europe: Croatia, Russia, Turkey and Ukraine; and Latin America: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela.

**Chart S40 The oil price and oil futures prices**

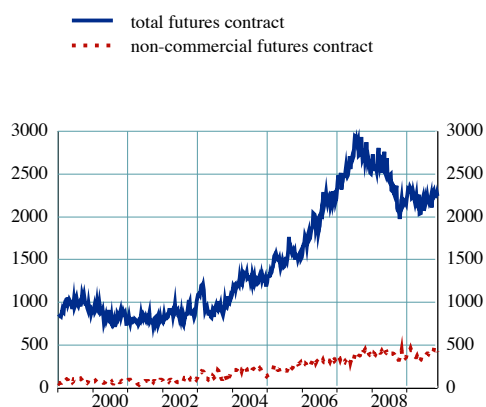
(Jan. 1999 - Dec. 2010; USD per barrel)



Sources: Thomson Reuters, Bloomberg and ECB calculations.

**Chart S41 Crude oil futures contracts**

(Jan. 1999 - Nov. 2009; thousands of contracts)

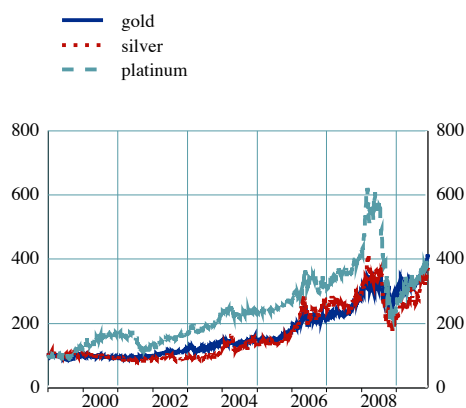


Source: Bloomberg.

Notes: Futures traded on the New York Mercantile Exchange. Non-commercial futures contracts are contracts bought for purposes other than hedging.

**Chart S42 Precious metal prices**

(Jan. 1999 - Nov. 2009; index: Jan.1999 = 100)



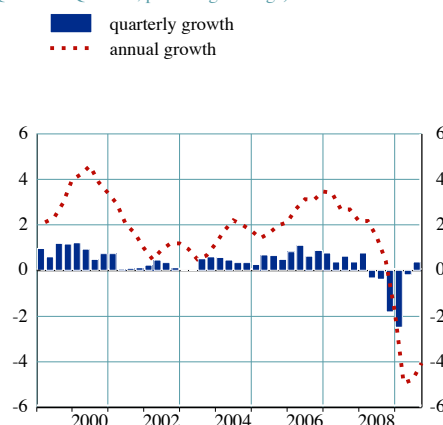
Sources: Bloomberg and ECB calculations.

Note: The indices are based on USD prices.

## 3 EURO AREA ENVIRONMENT

**Chart S43 Real GDP growth in the euro area**

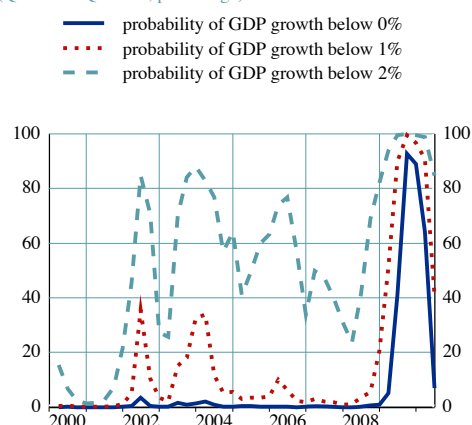
(Q1 1999 - Q3 2009; percentage change)



Sources: Eurostat and ECB calculations.

**Chart S44 Survey-based estimates of the four-quarter-ahead downside risk of weak real GDP growth in the euro area**

(Q1 2000 - Q2 2010; percentage)

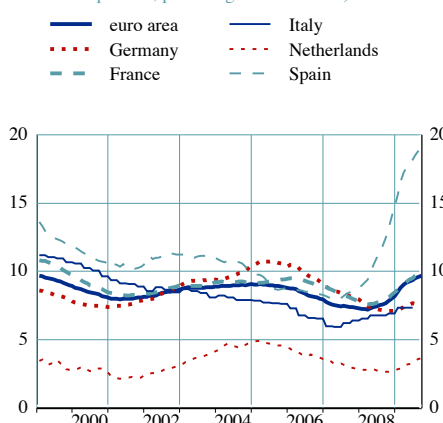


Sources: ECB Survey of Professional Forecasters (SPF) and ECB calculations.

Note: The indicators measure the percentage of the probability distribution for real GDP growth expectations over the following year being below the indicated threshold.

**Chart S45 Unemployment rate in the euro area and in selected euro area countries**

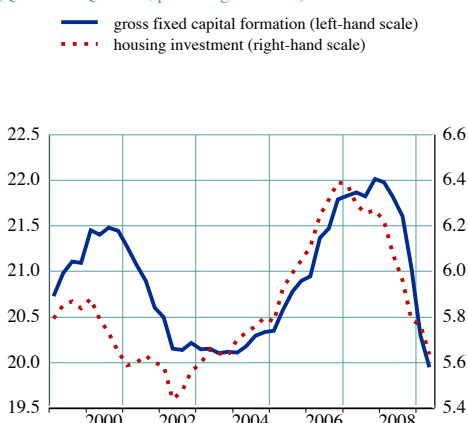
(Jan. 1999 - Sep. 2009; percentage of workforce)



Source: Eurostat.

**Chart S46 Gross fixed capital formation and housing investment in the euro area**

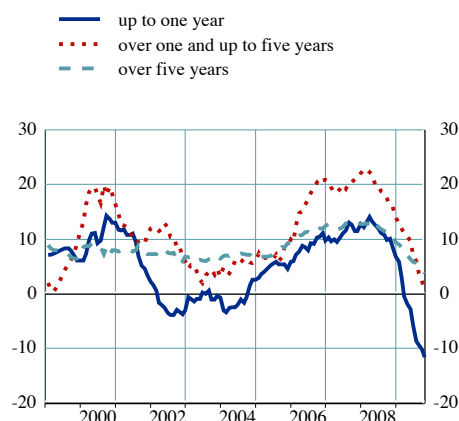
(Q1 1999 - Q2 2009; percentage of GDP)



Sources: Eurostat and ECB calculations.

**Chart S47 Annual growth in MFI loans to non-financial corporations in the euro area for selected maturities**

(Jan. 1999 - Oct. 2009; percentage change per annum)

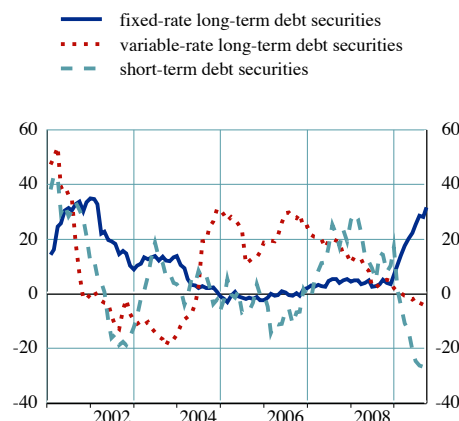


Sources: ECB and ECB calculations.

Notes: Data are based on financial transactions relating to loans provided by monetary financial institutions (MFI). The underlying data have partially been estimated for the period 1999 to 2002, and are not corrected for the impact of securitisation. For further details, see ECB, "Securitisation in the euro area", *Monthly Bulletin*, February 2008.

**Chart S48 Annual growth in debt securities issued by non-financial corporations in the euro area**

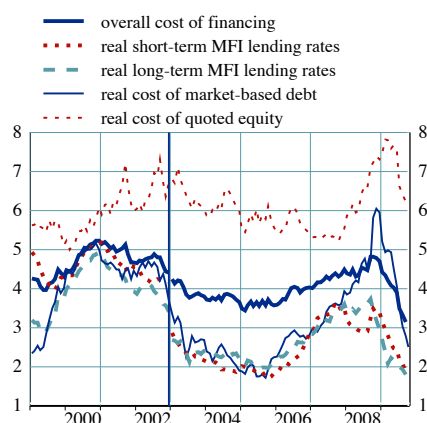
(Jan. 2001 - Sep. 2009; percentage change per annum)



Source: ECB.

**Chart S49 Real cost of the external financing of euro area non-financial corporations**

(Jan. 1999 - Oct. 2009; percentage)

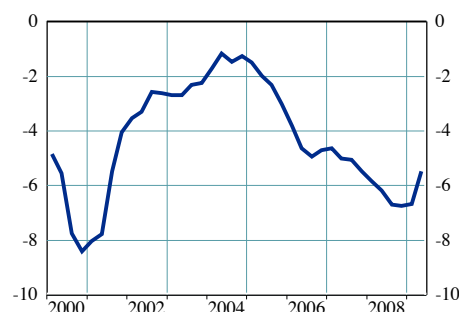


Sources: ECB, Thomson Reuters Datastream, Merrill Lynch, Consensus Economics Forecast and ECB calculations.

Notes: The real cost of external financing is calculated as the weighted average of the cost of bank lending, the cost of debt securities and the cost of equity, based on their respective amounts outstanding and deflated by inflation expectations. The introduction of MFI interest rate statistics at the beginning of 2003 led to a statistical break in the series.

**Chart S50 Net lending/borrowing of non-financial corporations in the euro area**

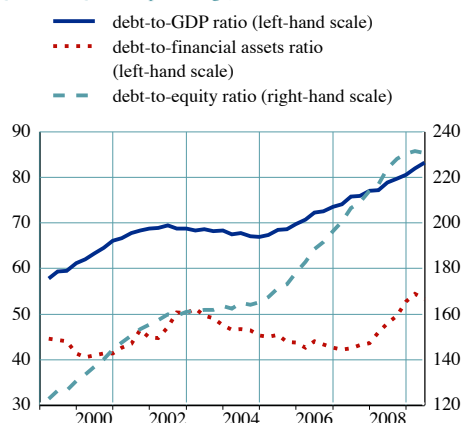
(Q1 2000 - Q2 2009; percentage of gross value added of non-financial corporations; four-quarter moving sum)



Sources: ECB and ECB calculations.

**Chart S51 Total debt of non-financial corporations in the euro area**

(Q1 1999 - Q2 2009; percentage)

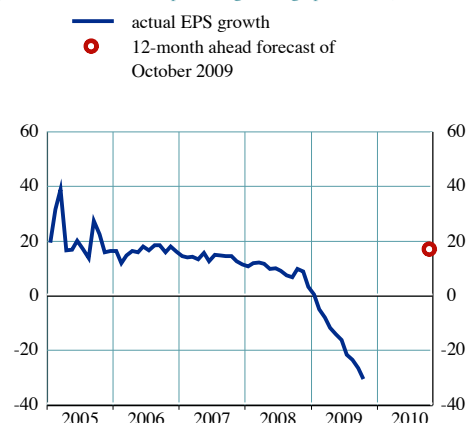


Sources: ECB, Eurostat and ECB calculations.

Notes: Debt includes loans, debt securities issued and pension fund reserves. The debt-to-equity ratio is calculated as a percentage of outstanding quoted shares issued by non-financial corporations, excluding the effect of valuation changes.

**Chart S52 Growth of earnings per share (EPS) and 12-month ahead growth forecast for euro area non-financial corporations**

(Jan. 2005 - Oct. 2010; percentage change per annum)

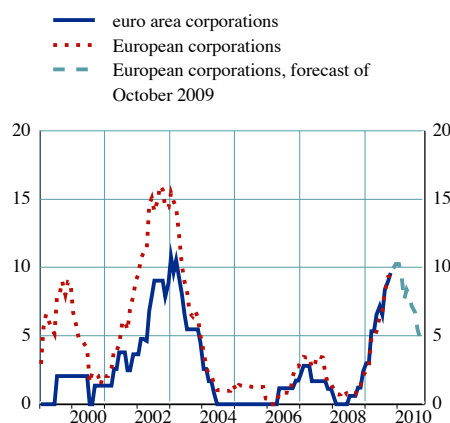


Sources: Thomson Reuters Datastream and ECB calculations.

Note: Growth rates are derived on the basis of aggregated EPS of Dow Jones STOXX indices for euro area non-financial corporation sub-sectors, using 12-month trailing EPS for actual figures and 12-month ahead EPS for the forecast.

**Chart S53 Euro area and European speculative-grade corporations' actual and forecast default rates**

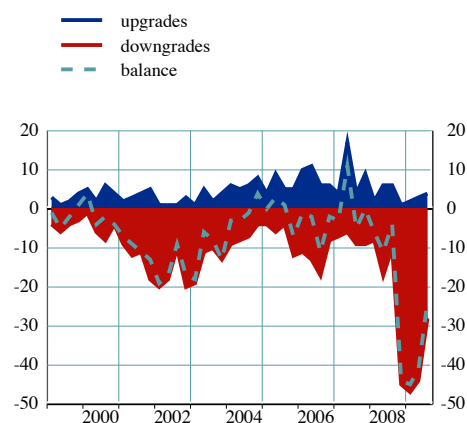
(Jan. 1999 - Oct. 2010; percentage; 12-month trailing sum)



Source: Moody's.

**Chart S54 Euro area non-financial corporations' rating changes**

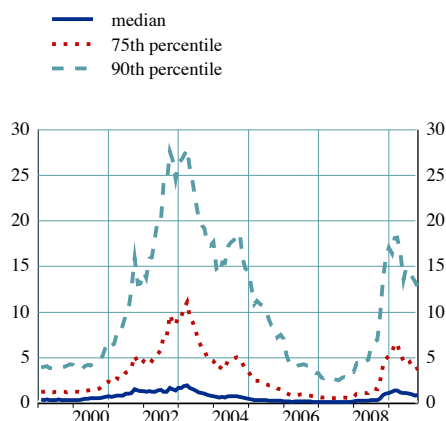
(Q1 1999 - Q3 2009; percentage)



Sources: Moody's and ECB calculations.

**Chart S55 Expected default frequency (EDF) of euro area non-financial corporations**

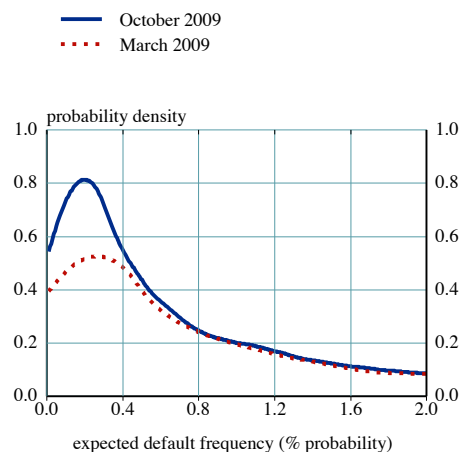
(Jan. 1999 - Oct. 2009; percentage probability)



Sources: Moody's KMV and ECB calculations.

Notes: The EDF provides an estimate of the probability of default over the following year. Due to measurement considerations, the EDF values are restricted by Moody's KMV to the interval between 0.01% and 35%.

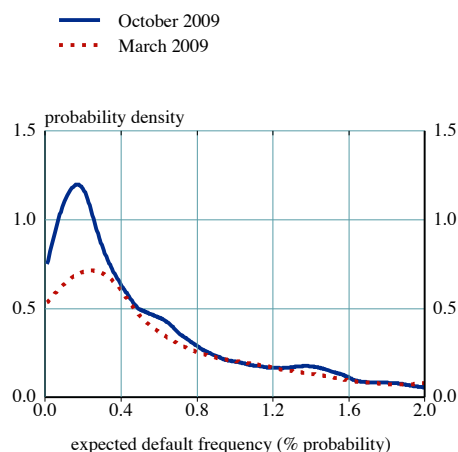
**Chart S56 Expected default frequency (EDF) distributions for non-financial corporations**



Sources: Moody's KMV and ECB calculations.

Note: The EDF provides an estimate of the probability of default over the following year.

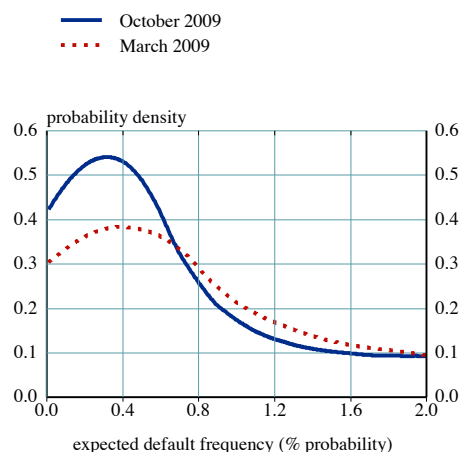
**Chart S57 Expected default frequency (EDF) distributions for large euro area non-financial corporations**



Sources: Moody's KMV and ECB calculations.

Notes: The EDF provides an estimate of the probability of default over the following year. The size is determined by the quartiles of the value of liabilities: it is large if in the upper quartile of the distribution.

**Chart S58 Expected default frequency (EDF) distributions for small euro area non-financial corporations**

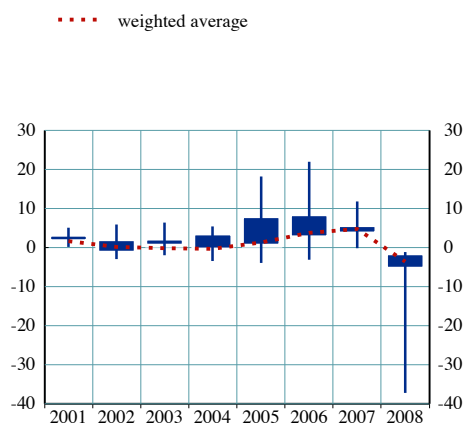


Sources: Moody's KMV and ECB calculations.

Notes: The EDF provides an estimate of the probability of default over the following year. The size is determined by the quartiles of the value of liabilities: it is small if in the lower quartile of the distribution.

**Chart S59 Euro area country distributions of commercial property capital value changes**

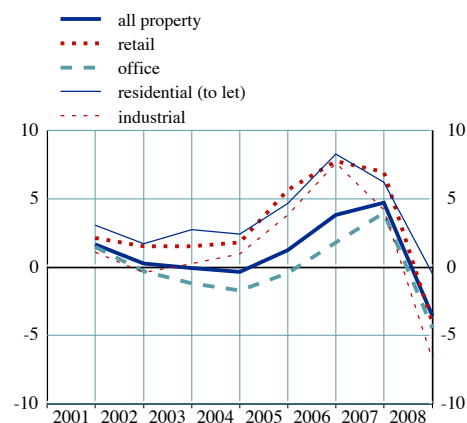
(2001 - 2008; capital values; percentage change per annum; minimum, maximum and interquartile distribution)



Sources: Investment Property databank and ECB calculations.  
Notes: Distribution of country-level data, covering ten euro area countries. The coverage of the total property sector within countries ranges from around 20% to 80%. Capital values are commercial property prices adjusted downward for capital expenditure, maintenance and depreciation. The values of the national commercial property markets are used as weights for the cross-country weighted averages.

**Chart S60 Euro area commercial property capital value changes in different sectors**

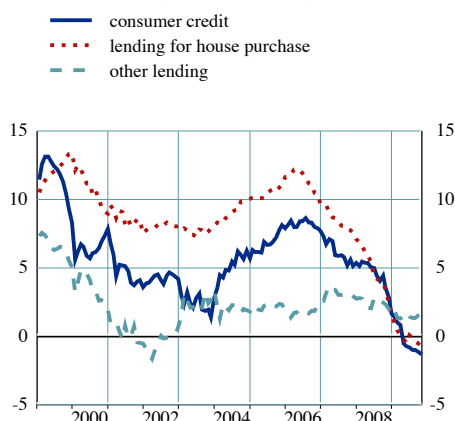
(2001 - 2008; capital values; percentage change per annum; cross-country weighted average)



Sources: Investment Property databank and ECB calculations.  
Notes: The data cover ten euro area countries. The coverage of the total property sector within countries ranges from around 20% to 80%. Capital values are commercial property prices adjusted downward for capital expenditure, maintenance and depreciation. The values of the national commercial property markets are used as weights for the cross-country weighted averages.

**Chart S61 Annual growth in MFI loans to households in the euro area**

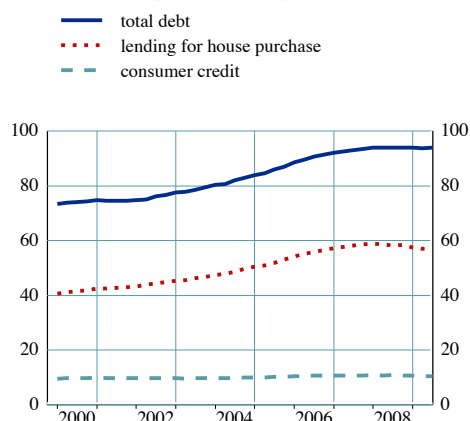
(Jan. 1999 - Oct. 2009; percentage change per annum)



Sources: ECB and ECB calculations.  
Notes: Data are based on financial transactions relating to loans provided by MFI. The underlying data have partially been estimated for the period 1999 to 2002, and are not corrected for the impact of securitisation. For more details see the note of Chart S47.

**Chart S62 Household debt-to-disposable income ratios in the euro area**

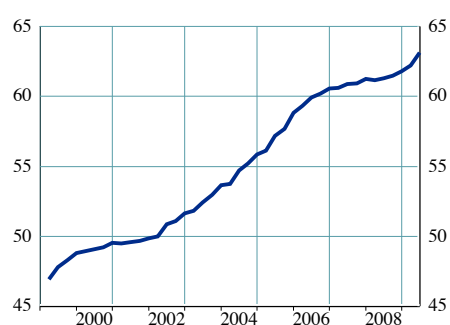
(Q4 1999 - Q2 2009; percentage of disposable income)



Sources: ECB and ECB calculations.  
Note: These series are the fourth-quarter moving sums of their raw series divided by the disposable income for the respective quarter.

**Chart S63 Household debt-to-GDP ratio in the euro area**

(Q1 1999 - Q2 2009; percentage)

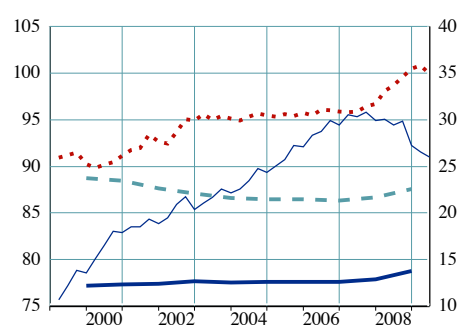


Sources: ECB, Eurostat and ECB calculations.

**Chart S64 Household debt-to-assets ratios in the euro area**

(Q1 1999 - Q2 2009; percentage)

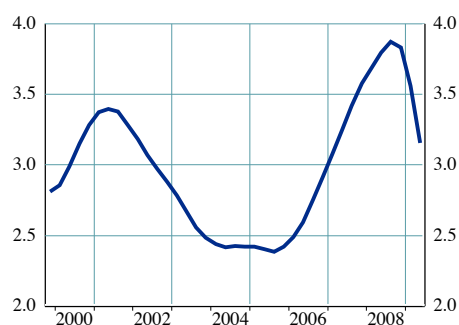
- household debt-to-wealth ratio (right-hand scale)
- ... household debt-to-financial assets ratio (right-hand scale)
- - household debt-to-housing wealth ratio (right-hand scale)
- household debt-to-liquid financial assets ratio (left-hand scale)



Sources: ECB, Eurostat and ECB calculations.

**Chart S65 Interest payment burden of the euro area household sector**

(Q4 1999 - Q2 2009; percentage of disposable income)

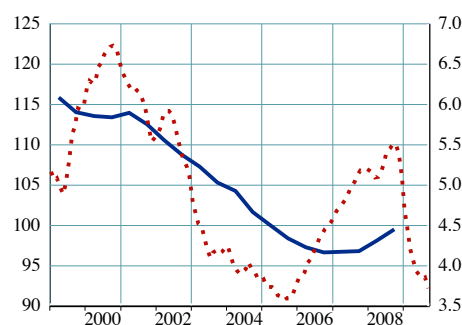


Sources: ECB.

**Chart S66 Narrow housing affordability and borrowing conditions in the euro area**

(Jan. 1999 - Sep. 2009; percentage of disposable income)

- ratio of disposable income to house prices (index: 2005=100; left-hand scale)
- ... lending rates on loans for house purchase (percentage; right-hand scale)

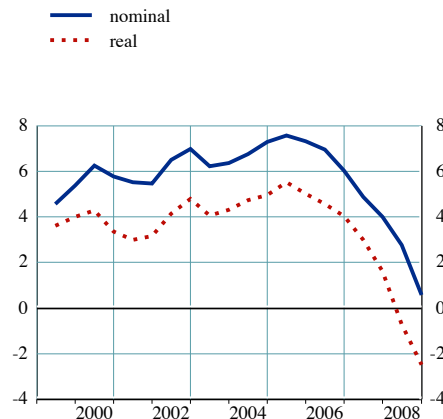


Sources: ECB and ECB calculations.

Notes: Data from January 1999 to December 2003 are based on estimates. The above narrow measure of housing affordability is defined as the ratio of the gross nominal disposable income to the nominal house price index.

**Chart S67 Residential property price changes in the euro area**

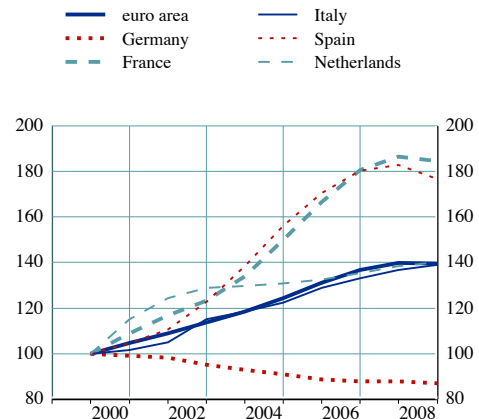
(H1 1999 - H2 2008; percentage change per annum)



Sources: Eurostat and ECB calculations based on national sources.  
Note: The real price series has been deflated by the Harmonised Index of Consumer Prices (HICP).

**Chart S68 House price-to-rent ratio for the euro area and selected euro area countries**

(1999 - 2008; index: 1999=100)



Sources: Eurostat and ECB calculations based on national sources.

**Table S4 Changes in residential property prices in the euro area countries**

(percentage change per annum)

|                           | Weight       | 1999<br>2005 | 2006       | 2007       | 2008       | 2008<br>H2 | 2009<br>H1 | 2008<br>Q4 | 2009<br>Q1 | 2009<br>Q2 | 2009<br>Q3 |
|---------------------------|--------------|--------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Belgium <sup>1)</sup>     | 3.7          | 9.2          | 11.1       | 9.2        | -          | -          | -          | -          | -          | -          | -          |
| Germany <sup>2)</sup>     | 26.9         | -0.6         | 0.2        | 0.7        | 0.2        | -          | -          | -          | -          | -          | -          |
| Ireland <sup>2)</sup>     | 2.0          | 13.6         | 13.4       | 0.9        | -9.4       | -9.8       | -10.4      | -9.7       | -9.8       | -11.1      | -12.9      |
| Greece <sup>2)</sup>      | 2.6          | 9.4          | 12.2       | 4.6        | 2.6        | 2.7        | -          | 2.9        | -          | -          | -          |
| Spain <sup>2)</sup>       | 11.8         | 12.9         | 10.4       | 5.8        | 0.7        | -1.4       | -7.6       | -3.2       | -6.8       | -8.3       | -8.0       |
| France <sup>1)</sup>      | 21.0         | 10.6         | 12.1       | 6.6        | 1.2        | -1.1       | -8.1       | -3.0       | -6.9       | -9.3       | -8.0       |
| Italy <sup>2)</sup>       | 17.0         | 6.0          | 5.8        | 5.0        | 4.2        | 4.0        | 3.1        | -          | -          | -          | -          |
| Cyprus <sup>2), 4)</sup>  | 0.2          | -            | 10.0       | 15.0       | 13.0       | -          | -          | -          | -          | -          | -          |
| Luxembourg <sup>2)</sup>  | 0.4          | 10.4         | 10.8       | 10.1       | -          | -          | -          | -          | -          | -          | -          |
| Malta <sup>2)</sup>       | 0.1          | 9.7          | 3.5        | 1.1        | -2.7       | -3.8       | -7.9       | -4.4       | -9.9       | -6.0       | -          |
| Netherlands <sup>1)</sup> | 6.4          | 9.0          | 4.6        | 4.2        | 2.9        | 2.2        | -1.5       | 1.7        | -0.3       | -2.8       | -5.1       |
| Austria <sup>2), 3)</sup> | 3.0          | 0.3          | 4.0        | 4.1        | 1.3        | 1.6        | 4.6        | 2.5        | 4.3        | 4.9        | -          |
| Portugal <sup>2)</sup>    | 1.8          | 3.8          | 2.1        | 1.3        | 3.9        | 4.7        | 1.5        | 4.7        | 2.7        | 0.3        | -0.8       |
| Slovenia                  | 0.4          | -            | 17.6       | 22.6       | 3.1        | 0.5        | -8.4       | -2.9       | -7.1       | -9.8       | -          |
| Slovakia <sup>1)</sup>    | 0.7          | -            | 16.8       | 23.9       | -          | -          | -          | -          | -          | -          | -          |
| Finland <sup>1)</sup>     | 2.0          | 5.9          | 6.4        | 5.5        | 0.6        | -1.8       | -4.5       | -3.9       | -5.6       | -3.5       | 0.2        |
| <b>euro area</b>          | <b>100.0</b> | <b>6.3</b>   | <b>6.5</b> | <b>4.4</b> | <b>1.7</b> | <b>0.6</b> | <b>-</b>   | <b>-</b>   | <b>-</b>   | <b>-</b>   | <b>-</b>   |

Sources: National sources and ECB calculations.

Notes: Weights are based on nominal GDP in 2008 and are expressed as percentage. The estimates of the euro area aggregate for the first and second halves of a year are partially based on the interpolation of annual data.

1) Existing dwellings (houses and flats); whole country.

2) All dwellings (new and existing houses and flats); whole country.

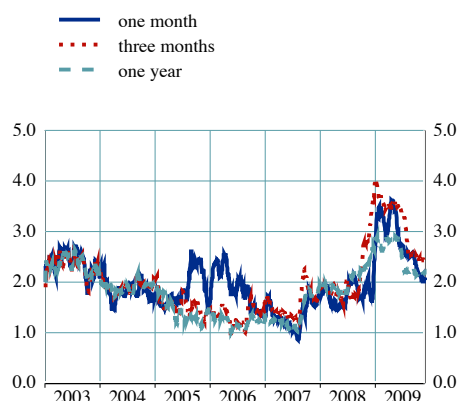
3) Up to 2000, data are for Vienna only.

4) The property price index is estimated by the Central Bank of Cyprus using data on valuations of property received from several MFIs and other indicators relevant to the housing market.

## 4 EURO AREA FINANCIAL MARKETS

**Chart S69 Bid-ask spreads for EONIA swap rates**

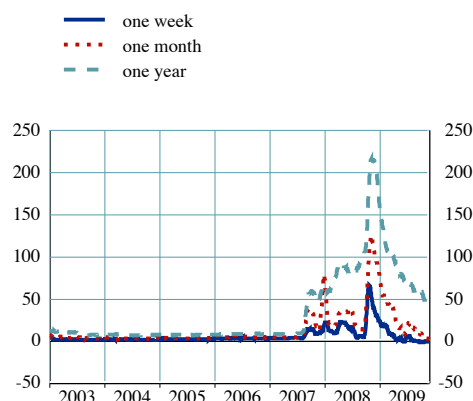
(Jan. 2003 - Nov. 2009; basis points; 20-day moving average; transaction-weighted)



Sources: Thomson Reuters and ECB calculations.

**Chart S70 Spreads between euro area interbank deposit and repo interest rates**

(Jan. 2003 - Nov. 2009; basis points; 20-day moving average)



Sources: Thomson Reuters and ECB calculations.

**Chart S71 Implied volatility of three-month EURIBOR futures**

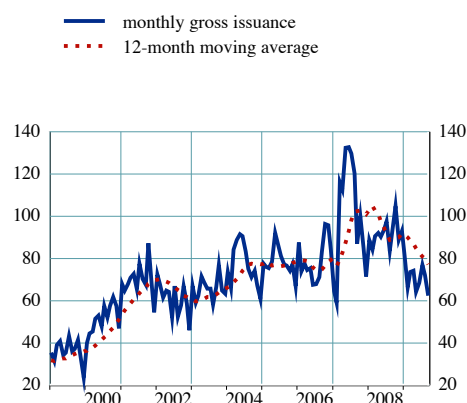
(Apr. 1999 - Nov. 2009; percentage; 60-day moving average)



Sources: Bloomberg and ECB calculations.  
Note: Weighted average of the volatility of the two closest options.

**Chart S72 Monthly gross issuance of short-term securities (other than shares) by euro area non-financial corporations**

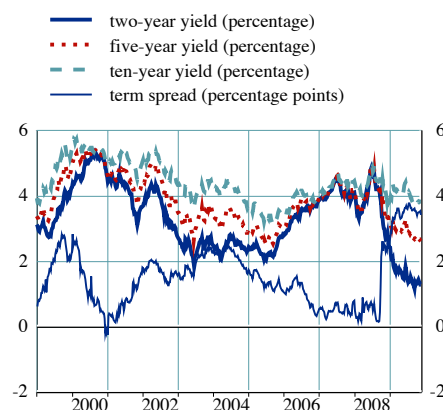
(Jan. 1999 - Sep. 2009; EUR billions; maturities up to one year)



Sources: ECB and ECB calculations.

**Chart S73 Euro area government bond yields and the term spread**

(Jan. 1999 - Nov. 2009; weekly averages)



Sources: ECB, Bloomberg and ECB calculations.  
Note: The term spread is the difference between the yield on ten-year bonds and that on three-month T-bills.

**Chart S74 Option-implied volatility for ten-year government bond yields in Germany**

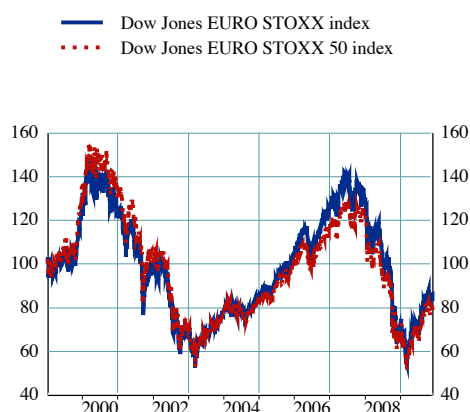
(Jan. 1999 - Nov. 2009; percentage; implied volatility; 20-day moving average)



Sources: Bloomberg and ECB calculations.

**Chart S75 Stock prices in the euro area**

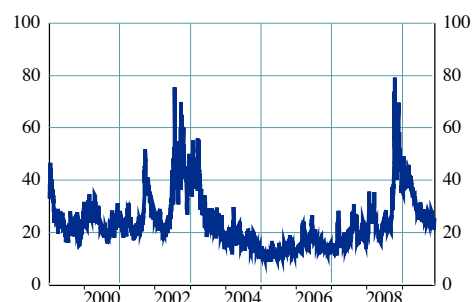
(Jan. 1999 - Nov. 2009; index: Jan. 1999=100)



Sources: Bloomberg and ECB calculations.

**Chart S76 Implied volatility for the Dow Jones EURO STOXX 50 index**

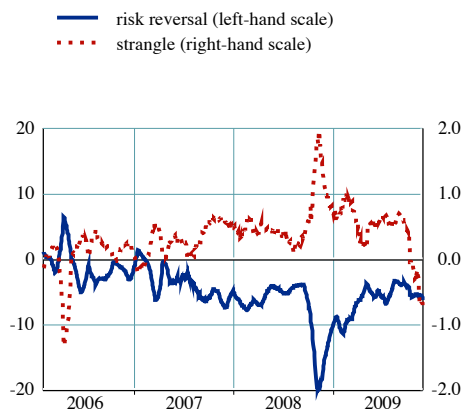
(Jan. 1999 - Nov. 2009; percentage)



Sources: Bloomberg and ECB calculations.  
Note: Weighted average of the volatility of the two closest options.

**Chart S77 Risk reversal and strangle of the Dow Jones EURO STOXX 50 index**

(Jan. 2006 - Nov. 2009; percentage; implied volatility; 20-day moving average)



Sources: Bloomberg and ECB calculations.

Notes: The risk-reversal indicator is calculated as the difference between the implied volatility of an out-of-the-money (OTM) call with 25 delta and the implied volatility of an OTM put with 25 delta. The strangle is calculated as the difference between the average implied volatility of OTM calls and puts, both with 25 delta, and the at-the-money volatility of calls and puts with 50 delta.

**Chart S78 Price/earnings (P/E) ratio for the euro area stock market**

(Jan. 1985 - Oct. 2009; ten-year trailing earnings)



Sources: Thomson Reuters Datastream 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.

**Chart S79 Open interest in options contracts on the Dow Jones EURO STOXX 50 index**

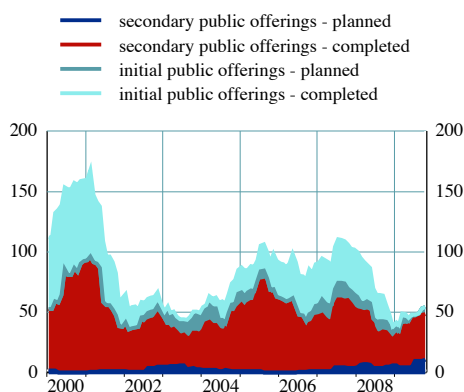
(Jan. 1999 - Oct. 2009; millions of contracts)



Sources: Eurex and Bloomberg.

**Chart S80 Gross equity issuance in the euro area**

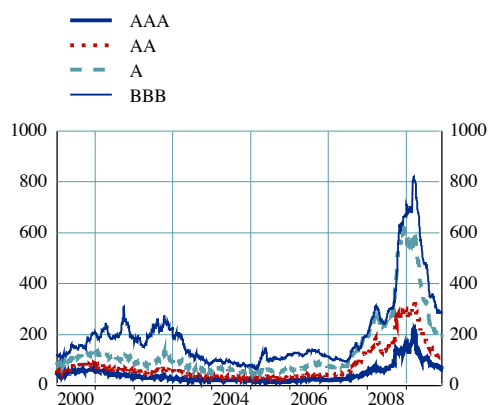
(Jan. 2000 - Oct. 2009; EUR billions; 12-month moving sum)



Source: Thomson ONE Banker.

**Chart S81 Investment-grade corporate bond spreads in the euro area**

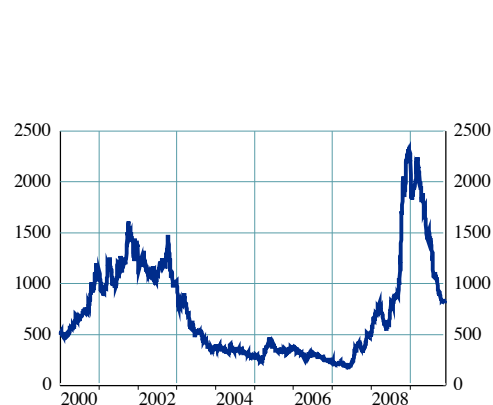
(Jan. 2000 - Nov. 2009; basis points)



Source: Merrill Lynch.  
Note: Options-adjusted spread of seven to ten-year corporate bond indices.

**Chart S82 Speculative-grade corporate bond spreads in the euro area**

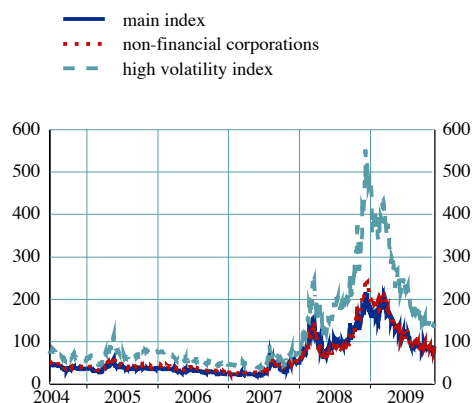
(Jan. 2000 - Nov. 2009; basis points)



Sources: Merrill Lynch.  
Note: Options-adjusted spread of euro area high-yield index (average rating B+, average maturity of 5 years).

**Chart S83 iTraxx Europe five-year credit default swap indices**

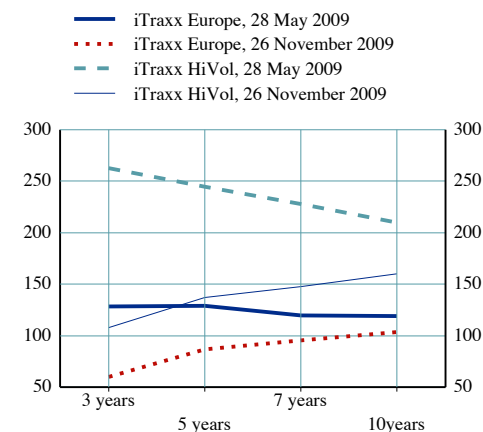
(June 2004 - Nov. 2009; basis points)



Sources: Bloomberg and ECB calculations.

**Chart S84 Term structures of premiums for iTraxx Europe and HiVol**

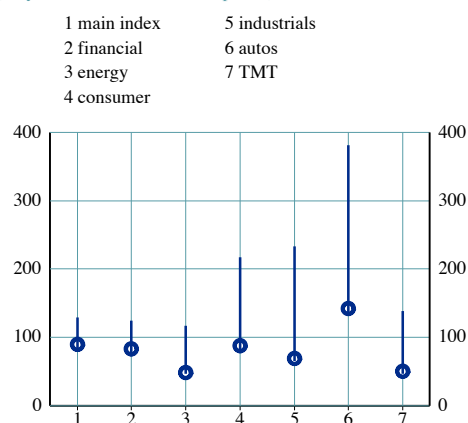
(basis points)



Source: Thomson Reuters Datastream.

**Chart S85 iTraxx sector indices**

(May 2009 - Nov. 2009; basis points)



Source: Bloomberg.

Note: The points show the most recent observation (26 Nov. 2009) and the bars show the range of variation over the six months to the most recent daily observation.

## 5 EURO AREA FINANCIAL INSTITUTIONS

**Table S5 Financial condition of large and complex banking groups in the euro area**

(2004 - H1 2009)

|                                                   | Minimum | First quartile | Median | Average | Weighted average <sup>1)</sup> | Third quartile | Maximum |
|---------------------------------------------------|---------|----------------|--------|---------|--------------------------------|----------------|---------|
| <b>Return on shareholders' equity (%)</b>         |         |                |        |         |                                |                |         |
| 2004                                              | 0.74    | 5.97           | 10.04  | 10.36   | 10.63                          | 14.33          | 26.66   |
| 2005                                              | 2.32    | 7.74           | 10.29  | 11.28   | 11.52                          | 12.89          | 29.20   |
| 2006                                              | 4.79    | 10.89          | 13.61  | 13.60   | 13.21                          | 15.46          | 26.01   |
| 2007                                              | 0.71    | 8.09           | 12.67  | 11.85   | 12.25                          | 15.81          | 24.69   |
| 2008                                              | -84.93  | -13.26         | 2.31   | -8.02   | 2.08                           | 5.39           | 18.88   |
| 2009 H1                                           | -44.30  | 2.46           | 5.06   | 3.29    | 4.72                           | 9.11           | 19.05   |
| <b>Return on risk-weighted assets (%)</b>         |         |                |        |         |                                |                |         |
| 2004                                              | 0.04    | 0.52           | 1.06   | 1.00    | 1.07                           | 1.43           | 2.03    |
| 2005                                              | 0.19    | 0.86           | 1.08   | 1.14    | 1.22                           | 1.53           | 2.26    |
| 2006                                              | 0.35    | 1.10           | 1.34   | 1.39    | 1.41                           | 1.71           | 2.66    |
| 2007                                              | 0.05    | 0.68           | 1.00   | 1.15    | 1.19                           | 1.69           | 2.55    |
| 2008                                              | -2.57   | -1.02          | 0.17   | -0.12   | 0.19                           | 0.62           | 1.77    |
| 2009 H1                                           | -4.82   | 0.23           | 0.54   | 0.32    | 0.51                           | 0.92           | 1.92    |
| <b>Net interest income (% of total assets)</b>    |         |                |        |         |                                |                |         |
| 2004                                              | 0.51    | 0.61           | 0.89   | 1.01    | 0.95                           | 1.31           | 1.90    |
| 2005                                              | 0.52    | 0.58           | 0.68   | 0.94    | 0.92                           | 1.30           | 1.87    |
| 2006                                              | 0.33    | 0.54           | 0.69   | 0.94    | 0.92                           | 1.22           | 2.03    |
| 2007                                              | 0.26    | 0.55           | 0.77   | 0.92    | 0.88                           | 1.20           | 1.95    |
| 2008                                              | 0.52    | 0.64           | 0.76   | 1.05    | 1.00                           | 1.43           | 2.19    |
| 2009 H1                                           | 0.48    | 0.70           | 1.13   | 1.24    | 1.24                           | 1.73           | 2.62    |
| <b>Net trading income (% of total assets)</b>     |         |                |        |         |                                |                |         |
| 2004                                              | 0.02    | 0.06           | 0.21   | 0.23    | 0.26                           | 0.32           | 0.74    |
| 2005                                              | 0.01    | 0.05           | 0.16   | 0.23    | 0.28                           | 0.32           | 0.83    |
| 2006                                              | 0.04    | 0.10           | 0.23   | 0.31    | 0.34                           | 0.49           | 1.08    |
| 2007                                              | -0.23   | 0.01           | 0.14   | 0.23    | 0.30                           | 0.42           | 0.96    |
| 2008                                              | -0.98   | -0.35          | -0.13  | -0.14   | -0.12                          | 0.02           | 0.41    |
| 2009 H1                                           | -2.13   | 0.11           | 0.21   | 0.07    | 0.19                           | 0.33           | 0.56    |
| <b>Fees and commissions (% of total assets)</b>   |         |                |        |         |                                |                |         |
| 2004                                              | 0.06    | 0.26           | 0.43   | 0.57    | 0.58                           | 0.91           | 1.28    |
| 2005                                              | 0.07    | 0.26           | 0.44   | 0.53    | 0.57                           | 0.84           | 1.27    |
| 2006                                              | 0.08    | 0.27           | 0.47   | 0.55    | 0.60                           | 0.80           | 1.10    |
| 2007                                              | 0.08    | 0.27           | 0.51   | 0.53    | 0.58                           | 0.70           | 1.10    |
| 2008                                              | 0.07    | 0.24           | 0.46   | 0.46    | 0.49                           | 0.62           | 0.92    |
| 2009 H1                                           | 0.07    | 0.21           | 0.37   | 0.43    | 0.47                           | 0.74           | 0.81    |
| <b>Other income (% of total assets)</b>           |         |                |        |         |                                |                |         |
| 2004                                              | 0.04    | 0.06           | 0.12   | 0.13    | 0.13                           | 0.15           | 0.43    |
| 2005                                              | -0.02   | 0.05           | 0.12   | 0.14    | 0.13                           | 0.15           | 0.64    |
| 2006                                              | 0.00    | 0.06           | 0.14   | 0.19    | 0.16                           | 0.25           | 0.71    |
| 2007                                              | -0.05   | 0.07           | 0.12   | 0.16    | 0.15                           | 0.21           | 0.51    |
| 2008                                              | -0.54   | -0.12          | 0.11   | 0.05    | 0.11                           | 0.24           | 0.54    |
| 2009 H1                                           | -0.30   | -0.09          | 0.06   | 0.04    | 0.04                           | 0.15           | 0.38    |
| <b>Total operating income (% of total assets)</b> |         |                |        |         |                                |                |         |
| 2004                                              | 0.82    | 1.26           | 1.86   | 1.95    | 1.92                           | 2.46           | 3.38    |
| 2005                                              | 0.78    | 1.29           | 1.77   | 1.85    | 1.90                           | 2.30           | 3.32    |
| 2006                                              | 0.77    | 1.51           | 1.85   | 1.98    | 2.02                           | 2.49           | 3.81    |
| 2007                                              | 0.51    | 1.25           | 1.81   | 1.84    | 1.91                           | 2.40           | 3.61    |
| 2008                                              | -0.19   | 0.58           | 1.36   | 1.42    | 1.48                           | 1.92           | 3.65    |
| 2009 H1                                           | 0.34    | 1.13           | 1.71   | 1.80    | 1.91                           | 2.13           | 3.83    |
| <b>Net income (% of total assets)</b>             |         |                |        |         |                                |                |         |
| 2004                                              | 0.02    | 0.22           | 0.40   | 0.41    | 0.42                           | 0.54           | 0.92    |
| 2005                                              | 0.08    | 0.36           | 0.41   | 0.46    | 0.48                           | 0.50           | 0.97    |
| 2006                                              | 0.16    | 0.41           | 0.51   | 0.55    | 0.54                           | 0.66           | 1.15    |
| 2007                                              | 0.02    | 0.23           | 0.39   | 0.47    | 0.46                           | 0.55           | 1.22    |
| 2008                                              | -1.21   | -0.23          | 0.06   | 0.01    | 0.07                           | 0.28           | 0.92    |
| 2009 H1                                           | -1.92   | 0.08           | 0.18   | 0.13    | 0.18                           | 0.27           | 1.03    |

**Table S5 Financial condition of large and complex banking groups in the euro area (continued)**

(2004 - H1 2009)

|                                                        | Minimum | First quartile | Median | Average | Weighted average <sup>1)</sup> | Third quartile | Maximum |
|--------------------------------------------------------|---------|----------------|--------|---------|--------------------------------|----------------|---------|
| <b>Net loan impairment charges (% of total assets)</b> |         |                |        |         |                                |                |         |
| 2004                                                   | 0.04    | 0.06           | 0.09   | 0.13    | 0.11                           | 0.16           | 0.40    |
| 2005                                                   | 0.01    | 0.05           | 0.07   | 0.10    | 0.10                           | 0.12           | 0.29    |
| 2006                                                   | 0.01    | 0.05           | 0.07   | 0.11    | 0.10                           | 0.12           | 0.36    |
| 2007                                                   | 0.01    | 0.03           | 0.05   | 0.10    | 0.10                           | 0.08           | 0.38    |
| 2008                                                   | 0.03    | 0.17           | 0.23   | 0.26    | 0.24                           | 0.37           | 0.57    |
| 2009 H1                                                | 0.18    | 0.33           | 0.40   | 0.43    | 0.43                           | 0.54           | 0.83    |
| <b>Cost-to-income ratio (%)</b>                        |         |                |        |         |                                |                |         |
| 2004                                                   | 44.40   | 55.15          | 64.08  | 61.60   | 64.39                          | 67.75          | 79.90   |
| 2005                                                   | 46.66   | 54.40          | 61.38  | 59.83   | 61.38                          | 64.85          | 73.70   |
| 2006                                                   | 42.56   | 53.50          | 56.50  | 57.53   | 59.21                          | 61.10          | 70.20   |
| 2007                                                   | 41.25   | 55.18          | 61.80  | 60.89   | 60.22                          | 67.75          | 84.70   |
| 2008                                                   | -326.30 | 62.32          | 70.97  | 96.02   | 71.03                          | 104.15         | 771.10  |
| 2009 H1                                                | 39.10   | 50.73          | 55.03  | 81.43   | 60.68                          | 68.75          | 472.81  |
| <b>Tier 1 ratio (%)</b>                                |         |                |        |         |                                |                |         |
| 2004                                                   | 5.25    | 7.33           | 7.90   | 8.13    | 8.11                           | 9.00           | 10.90   |
| 2005                                                   | 6.70    | 7.60           | 7.90   | 8.29    | 8.12                           | 8.75           | 11.60   |
| 2006                                                   | 6.70    | 7.53           | 7.80   | 8.15    | 8.02                           | 8.82           | 10.10   |
| 2007                                                   | 6.50    | 7.15           | 7.40   | 7.84    | 7.71                           | 8.60           | 10.70   |
| 2008                                                   | 6.90    | 7.85           | 8.60   | 8.76    | 8.60                           | 9.51           | 12.70   |
| 2009 H1                                                | 7.70    | 8.60           | 9.40   | 9.63    | 9.43                           | 10.60          | 13.00   |
| <b>Overall solvency ratio (%)</b>                      |         |                |        |         |                                |                |         |
| 2004                                                   | 8.50    | 10.63          | 11.10  | 11.35   | 11.19                          | 12.50          | 13.20   |
| 2005                                                   | 8.50    | 10.63          | 11.10  | 11.29   | 11.15                          | 11.90          | 13.50   |
| 2006                                                   | 10.00   | 10.75          | 11.10  | 11.29   | 11.22                          | 11.77          | 12.90   |
| 2007                                                   | 8.80    | 9.65           | 10.50  | 10.71   | 10.61                          | 11.50          | 13.00   |
| 2008                                                   | 9.00    | 10.70          | 12.10  | 11.70   | 11.61                          | 12.54          | 13.90   |
| 2009 H1                                                | 9.50    | 11.20          | 12.50  | 12.53   | 12.47                          | 13.65          | 15.40   |

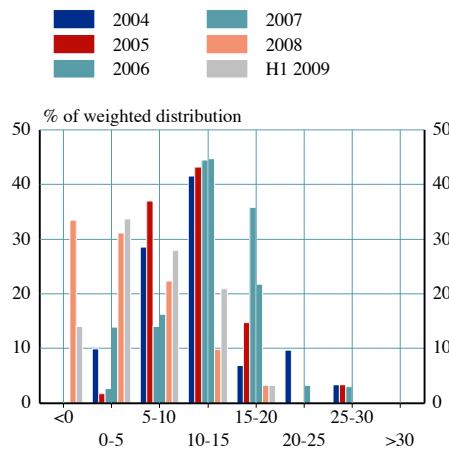
Sources: Individual institutions' financial reports and ECB calculations.

Notes: Based on available figures for 19 IFRS-reporting large and complex banking groups in the euro area. Figures for H1 2009 are annualised.

- 1) The respective denominators are used as weights, i.e. the total operating income is used in the case of the "Cost-to-income ratio", while the risk-weighted assets are used for the "Tier 1 ratio" and the "Overall solvency ratio".

**Chart S86 Frequency distribution of returns on shareholders' equity for large and complex banking groups in the euro area**

(2004 - H1 2009; percentage)

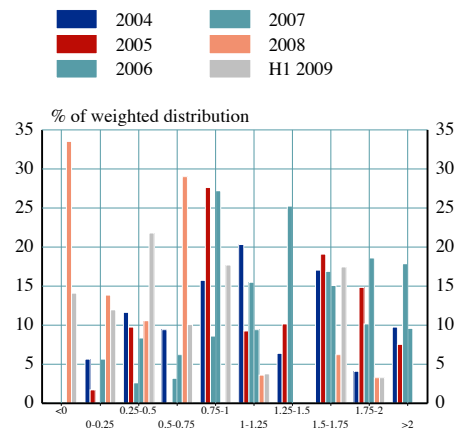


Sources: Individual institutions' financial reports and ECB calculations.

Notes: Distribution weighted by total assets. Based on available figures for 19 IFRS-reporting large and complex banking groups in the euro area. Figures for H1 2009 are annualised.

**Chart S87 Frequency distribution of returns on risk-weighted assets for large and complex banking groups in the euro area**

(2004 - H1 2009; percentage)

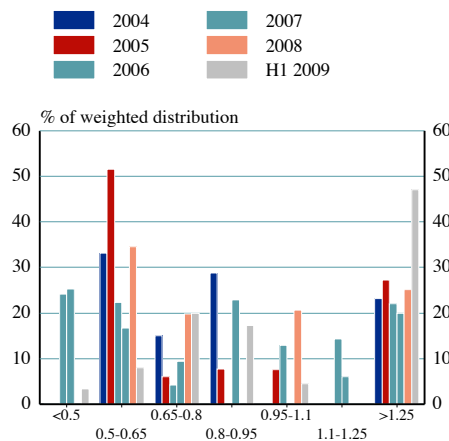


Sources: Individual institutions' financial reports and ECB calculations.

Notes: Distribution weighted by total assets. Based on available figures for 19 IFRS-reporting large and complex banking groups in the euro area. Figures for H1 2009 are annualised.

**Chart S88 Frequency distribution of net interest income for large and complex banking groups in the euro area**

(2004 - H1 2009; percentage of total assets)

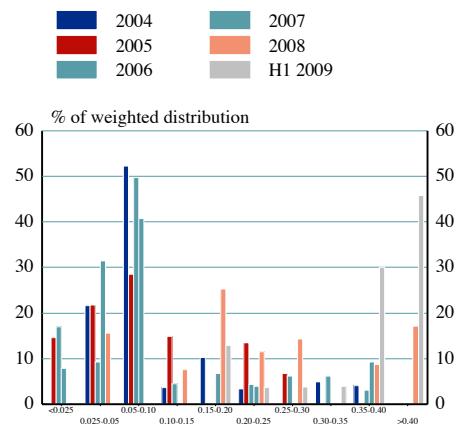


Sources: Individual institutions' financial reports and ECB calculations.

Notes: Distribution weighted by total assets. Based on available figures for 19 IFRS-reporting large and complex banking groups in the euro area. Figures for H1 2009 are annualised.

**Chart S89 Frequency distribution of net loan impairment charges for large and complex banking groups in the euro area**

(2004 - H1 2009; percentage of total assets)

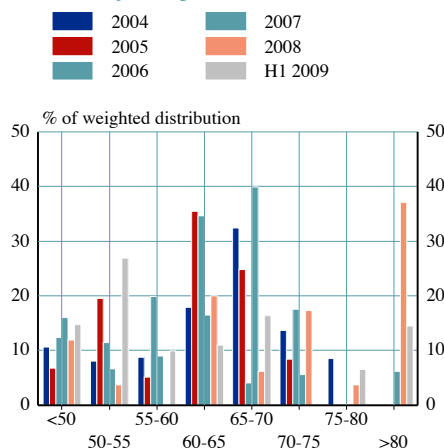


Sources: Individual institutions' financial reports and ECB calculations.

Notes: Distribution weighted by total assets. Based on available figures for 19 IFRS-reporting large and complex banking groups in the euro area. Figures for H1 2009 are annualised.

**Chart S90 Frequency distribution of cost-to-income ratios for large and complex banking groups in the euro area**

(2004 - H1 2009; percentage)

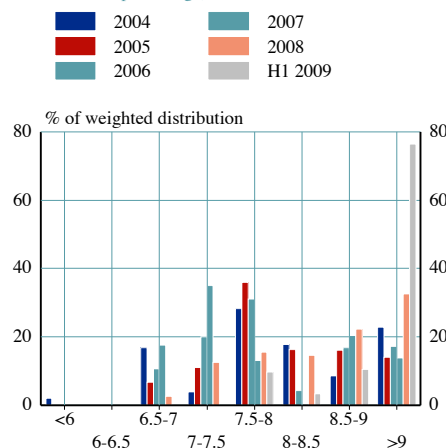


Sources: Individual institutions' financial reports and ECB calculations.

Notes: Distribution weighted by total assets. Based on available figures for 19 IFRS-reporting large and complex banking groups in the euro area.

**Chart S91 Frequency distribution of Tier I ratios for large and complex banking groups in the euro area**

(2004 - H1 2009; percentage)

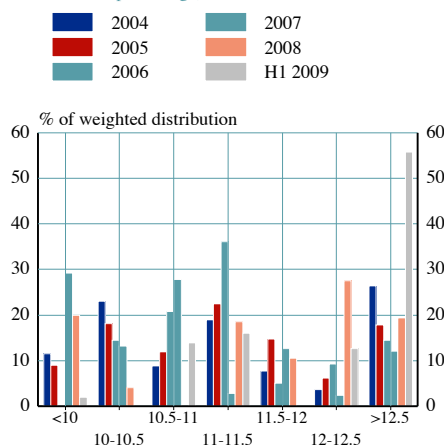


Sources: Individual institutions' financial reports and ECB calculations.

Notes: Distribution weighted by total assets. Based on available figures for 19 IFRS-reporting large and complex banking groups in the euro area.

**Chart S92 Frequency distribution of overall solvency ratios for large and complex banking groups in the euro area**

(2004 - H1 2009; percentage)

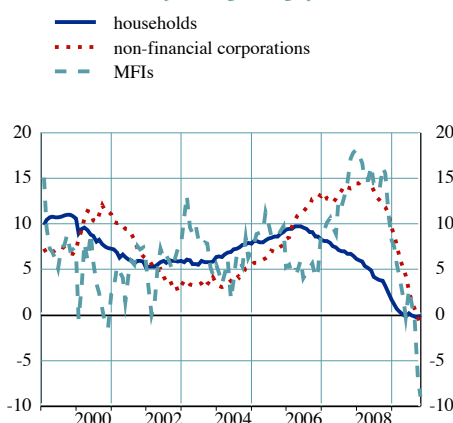


Sources: Individual institutions' financial reports and ECB calculations.

Notes: Distribution weighted by total assets. Based on available figures for 19 IFRS-reporting large and complex banking groups in the euro area.

**Chart S93 Annual growth in euro area MFI loans, broken down by sectors**

(Jan. 1999 - Oct. 2009; percentage change per annum)

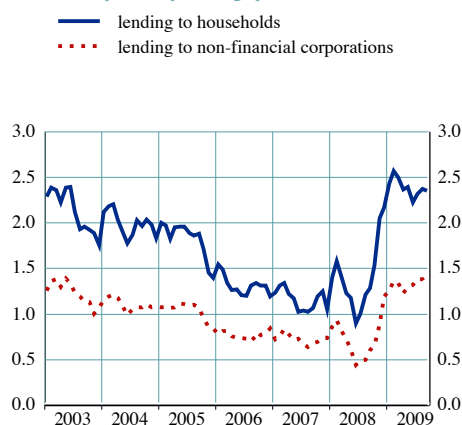


Sources: ECB and ECB calculations.

Notes: Data are based on financial transactions of MFI loans, not corrected for the impact of securitisation. For more details see the note of Chart S47.

**Chart S94 Lending margins of euro area MFIs**

(Jan. 2003 - Sep. 2009; percentage points)

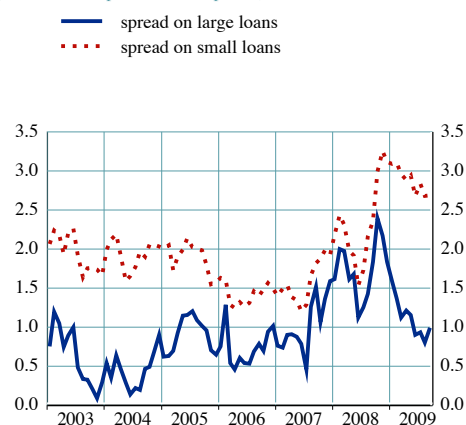


Sources: ECB, Thomson Reuters, Thomson Reuters Datastream and ECB calculations.

Note: The weighted lending margins are the difference between the interest rate on new lending and the interest rate swap rate, where both have corresponding initial periods of rate fixation/maturity.

**Chart S95 Euro area MFI loan spreads**

(Jan. 2003 - Sep. 2009; basis points)

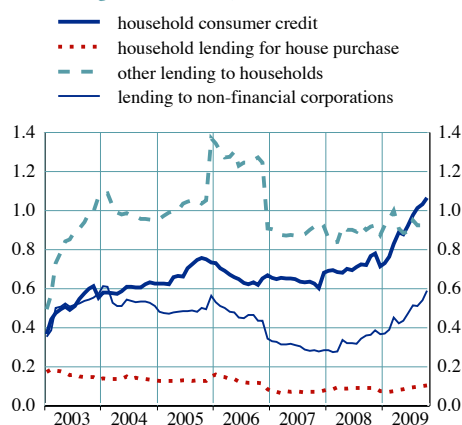


Sources: ECB, Thomson Reuters Datastream and ECB calculations.

Note: The spread is the difference between the rate on loans to non-financial corporations with initial rate fixation period of one to five years and the three-year government bond yield, for small (up to EUR 1 million) and large (above EUR 1 million) loans respectively.

**Chart S96 Write-off rates on euro area MFI loans**

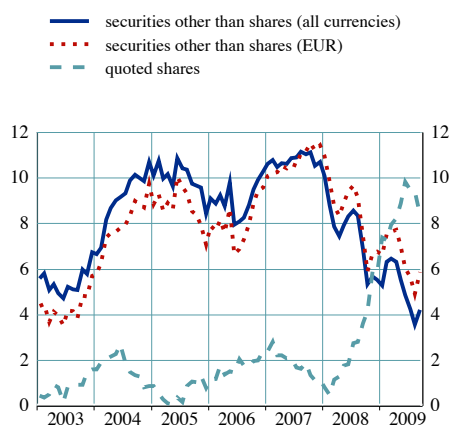
(Jan. 2003 - Oct. 2009; 12-month moving sums; percentage of the outstanding amount of loans)



Sources: ECB and ECB calculations.

**Chart S97 Annual growth in euro area MFI's issuance of securities and shares**

(Jan. 2003 - Sep. 2009; percentage change per annum)



Source: ECB.

**Chart S98 Deposit margins of euro area MFIs**

(Jan. 2003 - Sep. 2009; percentage points)

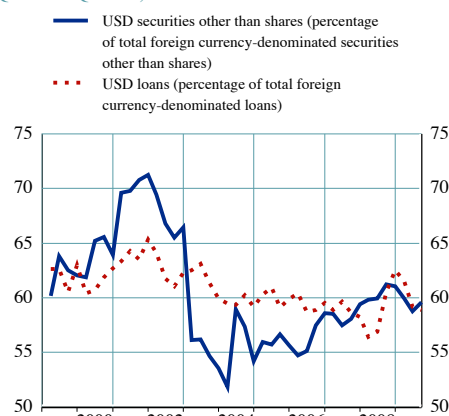


Sources: ECB, Thomson Reuters, Thomson Reuters Datastream and ECB calculations.

Note: The weighted deposit margins are the difference between the interest rate swap rate and the deposit rate, where both have corresponding initial periods of rate fixation/maturity.

**Chart S99 Euro area MFI foreign currency-denominated assets, selected balance sheet items**

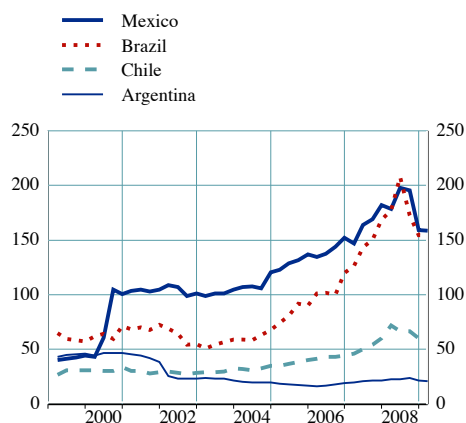
(Q1 1999 - Q3 2009)



Sources: ECB and ECB calculations.

**Chart S100 Consolidated foreign claims of domestically owned euro area banks on Latin American countries**

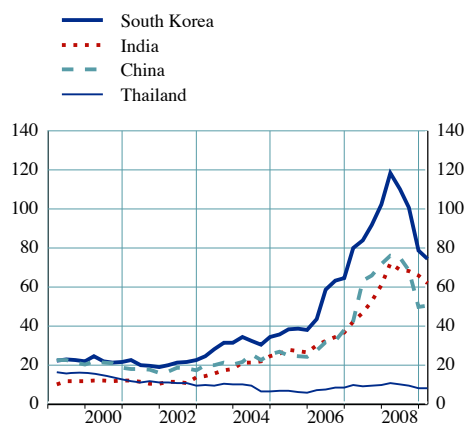
(Q1 1999 - Q1 2009; USD billions)



Sources: BIS and ECB calculations.

**Chart S101 Consolidated foreign claims of domestically owned euro area banks on Asian countries**

(Q1 1999 - Q1 2009; USD billions)



Sources: BIS and ECB calculations.

**Table S6 Consolidated foreign claims of domestically owned euro area banks on individual countries**

(percentage of total consolidated foreign claims)

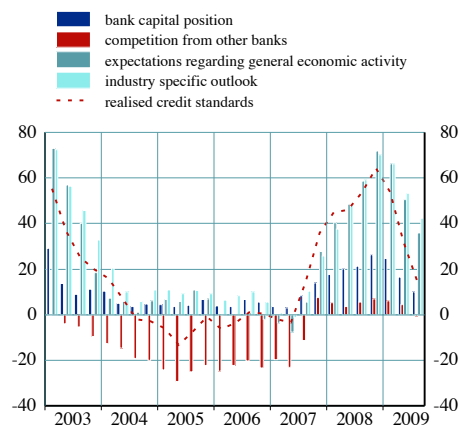
|                                                         | 2006<br>Q4  | 2007<br>Q1  | 2007<br>Q2  | 2007<br>Q3  | 2007<br>Q4  | 2008<br>Q1  | 2008<br>Q2  | 2008<br>Q3  | 2008<br>Q4  | 2009<br>Q1  |
|---------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Total offshore centres</b>                           | <b>7.3</b>  | <b>7.2</b>  | <b>7.5</b>  | <b>8.0</b>  | <b>8.2</b>  | <b>7.9</b>  | <b>7.8</b>  | <b>8.0</b>  | <b>7.5</b>  | <b>7.1</b>  |
| <i>of which</i>                                         |             |             |             |             |             |             |             |             |             |             |
| Hong Kong                                               | 0.8         | 0.7         | 0.7         | 0.7         | 0.7         | 0.8         | 0.7         | 0.8         | 0.8         | 0.7         |
| Singapore                                               | 0.6         | 0.7         | 0.9         | 0.7         | 0.7         | 0.8         | 0.9         | 0.9         | 0.8         | 0.9         |
| <b>Total Asia and Pacific EMEs</b>                      | <b>3.1</b>  | <b>3.2</b>  | <b>3.4</b>  | <b>3.5</b>  | <b>3.9</b>  | <b>4.0</b>  | <b>4.1</b>  | <b>4.0</b>  | <b>3.8</b>  | <b>3.9</b>  |
| <i>of which</i>                                         |             |             |             |             |             |             |             |             |             |             |
| China                                                   | 0.5         | 0.5         | 0.7         | 0.7         | 0.8         | 0.7         | 0.8         | 0.8         | 0.6         | 0.7         |
| India                                                   | 0.5         | 0.5         | 0.5         | 0.6         | 0.6         | 0.7         | 0.7         | 0.7         | 0.8         | 0.8         |
| Indonesia                                               | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         |
| Malaysia                                                | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.1         | 0.1         | 0.1         |
| Philippines                                             | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         |
| South Korea                                             | 0.9         | 0.9         | 0.9         | 1.0         | 1.1         | 1.2         | 1.1         | 1.1         | 1.0         | 1.0         |
| Taiwan China                                            | 0.3         | 0.2         | 0.2         | 0.3         | 0.3         | 0.3         | 0.4         | 0.3         | 0.2         | 0.2         |
| Thailand                                                | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         |
| <b>Total European EMEs<br/>and new EU Member States</b> | <b>8.7</b>  | <b>9.1</b>  | <b>9.2</b>  | <b>10.1</b> | <b>11.2</b> | <b>11.4</b> | <b>12.3</b> | <b>12.6</b> | <b>13.5</b> | <b>13.1</b> |
| <i>of which</i>                                         |             |             |             |             |             |             |             |             |             |             |
| Czech Republic                                          | 1.4         | 1.4         | 1.4         | 1.6         | 1.6         | 1.8         | 2.0         | 2.0         | 2.0         | 2.0         |
| Hungary                                                 | 1.1         | 1.2         | 1.2         | 1.3         | 1.4         | 1.4         | 1.5         | 1.5         | 1.7         | 1.7         |
| Poland                                                  | 1.6         | 1.8         | 1.9         | 2.0         | 2.2         | 2.4         | 2.7         | 2.8         | 2.9         | 2.7         |
| Russia                                                  | 1.0         | 1.1         | 1.2         | 1.5         | 1.6         | 1.6         | 1.8         | 1.9         | 2.1         | 2.0         |
| Turkey                                                  | 0.9         | 0.9         | 0.9         | 1.0         | 1.1         | 1.0         | 1.1         | 1.2         | 1.2         | 1.2         |
| <b>Total Latin America</b>                              | <b>5.2</b>  | <b>4.7</b>  | <b>4.9</b>  | <b>5.0</b>  | <b>5.3</b>  | <b>5.2</b>  | <b>5.8</b>  | <b>5.9</b>  | <b>5.9</b>  | <b>6.2</b>  |
| <i>of which</i>                                         |             |             |             |             |             |             |             |             |             |             |
| Argentina                                               | 0.3         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.3         | 0.3         | 0.3         |
| Brazil                                                  | 1.6         | 1.5         | 1.6         | 1.6         | 1.8         | 1.7         | 2.1         | 1.9         | 1.9         | 2.0         |
| Chile                                                   | 0.6         | 0.5         | 0.6         | 0.6         | 0.6         | 0.7         | 0.7         | 0.7         | 0.8         | 0.8         |
| Colombia                                                | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         |
| Ecuador                                                 | 0.0         | 0.0         | 0.0         | 0.0         | 0.0         | 0.0         | 0.0         | 0.0         | 0.0         | 0.0         |
| Mexico                                                  | 2.0         | 1.7         | 1.8         | 1.8         | 1.9         | 1.8         | 2.0         | 2.1         | 2.0         | 2.1         |
| Peru                                                    | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.2         | 0.2         | 0.2         |
| Uruguay                                                 | 0.0         | 0.0         | 0.0         | 0.0         | 0.0         | 0.0         | 0.0         | 0.0         | 0.0         | 0.1         |
| Venezuela                                               | 0.3         | 0.3         | 0.3         | 0.3         | 0.3         | 0.2         | 0.2         | 0.3         | 0.3         | 0.4         |
| <b>Total Middle East and Africa</b>                     | <b>1.9</b>  | <b>1.9</b>  | <b>2.0</b>  | <b>2.1</b>  | <b>2.3</b>  | <b>2.4</b>  | <b>2.5</b>  | <b>2.6</b>  | <b>2.9</b>  | <b>3.1</b>  |
| <i>of which</i>                                         |             |             |             |             |             |             |             |             |             |             |
| Iran                                                    | 0.2         | 0.2         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         | 0.1         |
| Morocco                                                 | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.3         | 0.3         | 0.3         | 0.3         |
| South Africa                                            | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         |
| <b>Total non-developed countries</b>                    | <b>26.2</b> | <b>26.0</b> | <b>27.0</b> | <b>28.7</b> | <b>30.8</b> | <b>30.8</b> | <b>32.5</b> | <b>33.1</b> | <b>33.6</b> | <b>33.4</b> |

Source: BIS and ECB calculations.

Notes: Aggregates derived as the sum of foreign claims of euro area 12 countries (i.e. euro area excluding Cyprus, Malta, Slovakia and Slovenia) on the specified counterpart areas.

**Chart S102 Credit standards applied by euro area banks to loans and credit lines to enterprises, and contributing factors**

(Q1 2003 - Q3 2009; net percentage; two-quarter moving average)

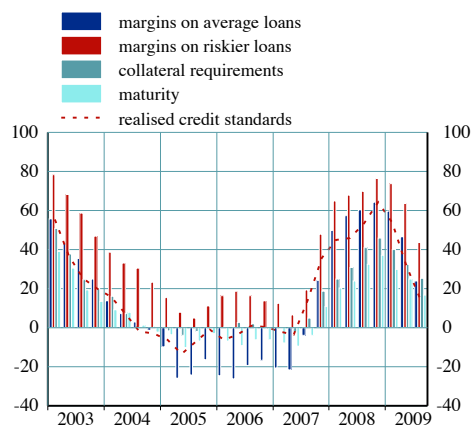


Sources: ECB and ECB calculations.

Notes: For credit standards, the net percentages refer to the difference between those banks reporting that they have been tightened in comparison with the previous quarter and those reporting that they have been eased. For the contributing factors, the net percentages refer to the difference between those banks reporting that the given factor has contributed to a tightening compared to the previous quarter and those reporting that it contributed to an easing.

**Chart S103 Credit standards applied by euro area banks to loans and credit lines to enterprises, and terms and conditions**

(Q1 2003 - Q3 2009; net percentage; two-quarter moving average)

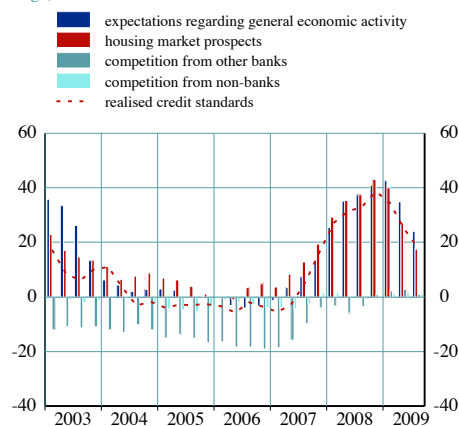


Sources: ECB and ECB calculations.

Notes: The net percentages refer to the difference between those banks reporting that credit standards, terms and conditions have been tightened in comparison with the previous quarter and those reporting that they have been eased.

**Chart S104 Credit standards applied by euro area banks to loans to households for house purchase, and contributing factors**

(Q1 2003 - Q3 2009; net percentage; two-quarter moving average)

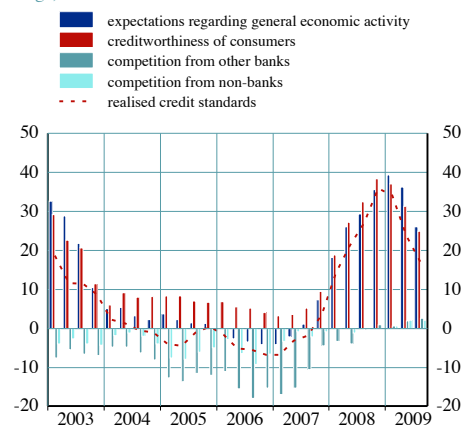


Sources: ECB and ECB calculations.

Note: See the note of Chart S102.

**Chart S105 Credit standards applied by euro area banks to consumer credit, and contributing factors**

(Q1 2003 - Q3 2009; net percentage; two-quarter moving average)

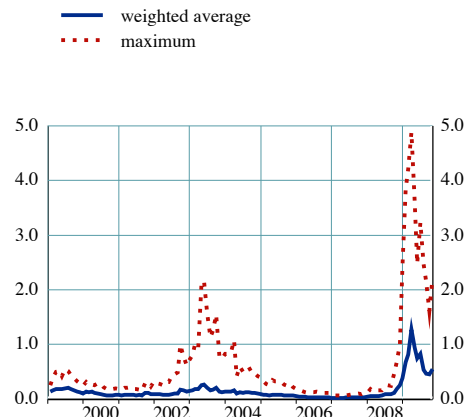


Sources: ECB and ECB calculations.

Note: See the note of Chart S102.

**Chart S106 Expected default frequency (EDF) for large and complex banking groups in the euro area**

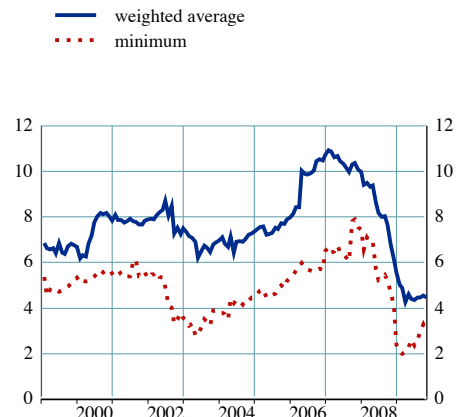
(Jan. 1999 - Oct. 2009; percentage probability)



Sources: Moody's KMV and ECB calculations.  
Note: The EDF provides an estimate of the probability of default over the following year. Due to measurement considerations, the EDF values are restricted by Moody's KMV to the interval between 0.01% and 35%.

**Chart S107 Distance-to-default for large and complex banking groups in the euro area**

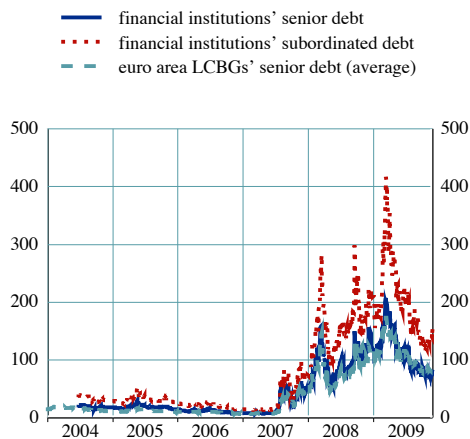
(Jan. 1999 - Oct. 2009)



Sources: Moody's and ECB calculations.  
Note: An increase in the distance-to-default reflects an improving assessment.

**Chart S108 Credit default swap spreads for European financial institutions and euro area large and complex banking groups**

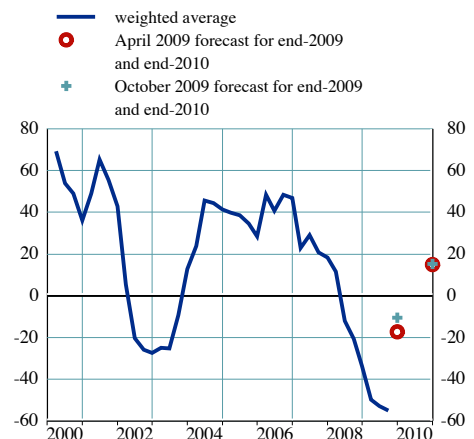
(Jan. 2004 - Nov. 2009; basis points; five-year maturity)



Sources: Bloomberg and ECB calculations.

**Chart S109 Earnings and earnings forecasts for large and complex banking groups in the euro area**

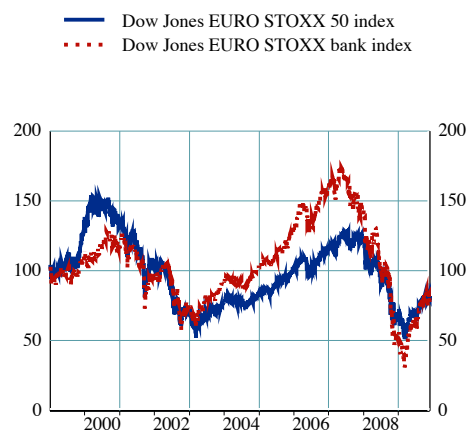
(Q1 2000 - Q4 2010; percentage change per annum; weighted average)



Sources: Thomson Reuters Datastream, I/B/E/S and ECB calculations.  
Notes: Growth rates of weighted average earnings for euro area large and complex banking groups, using their market capitalisations as weights. Actual earnings are derived on the basis of historical net income; forecasts are derived from IBES estimates of earnings per share.

**Chart S110 Dow Jones EURO STOXX total market and bank indices**

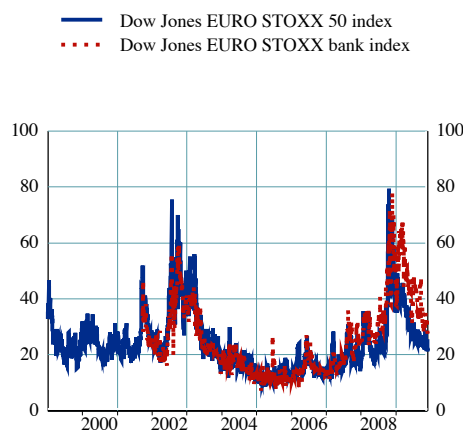
(Jan. 1999 - Nov. 2009; index: Jan. 1999 = 100)



Sources: Bloomberg and ECB calculations.

**Chart S111 Implied volatility for Dow Jones EURO STOXX total market and bank indices**

(Jan. 1999 - Nov. 2009; percentage)

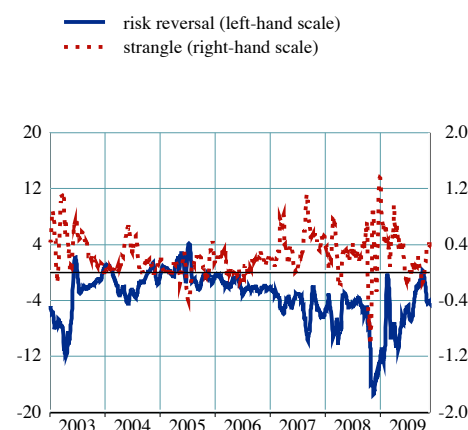


Source: Bloomberg and ECB calculations.

Note: Weighted average of the volatility of the two closest options.

**Chart S112 Risk reversal and strangle of the Dow Jones EURO STOXX bank index**

(Jan. 2003 - Nov. 2009; percentage; implied volatility; 20-day moving average)

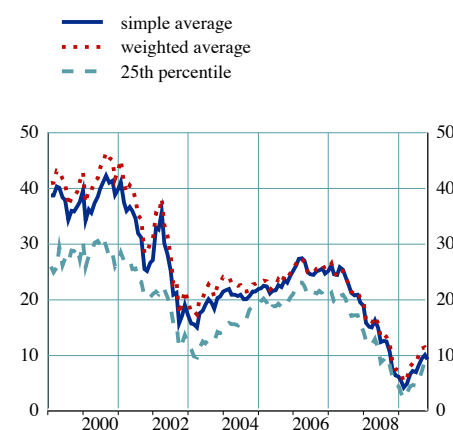


Sources: Bloomberg and ECB calculations.

Notes: The risk-reversal indicator is calculated as the difference between the implied volatility of an out-of-the-money (OTM) call with 25 delta and the implied volatility of an OTM put with 25 delta. The strangle is calculated as the difference between the average implied volatility of OTM calls and puts, both with 25 delta, and the at-the-money volatility of calls and puts with 50 delta.

**Chart S113 Price/earnings (P/E) ratios for large and complex banking groups in the euro area**

(Jan. 1999 - Oct. 2009; ten-year trailing earnings)

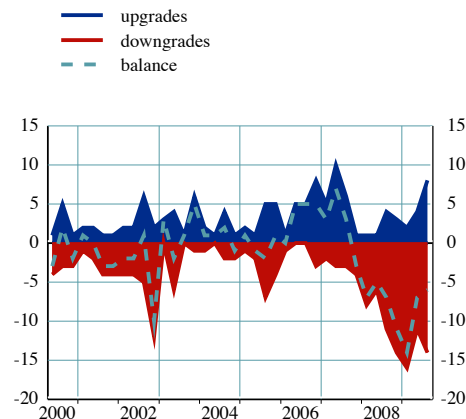


Sources: Thomson Reuters Datastream, I/B/E/S and ECB calculations.

Note: The P/E ratio is based on prevailing stock prices relative to an average of the previous ten years of earnings.

**Chart S114 Changes in the ratings of large and complex banking groups in the euro area**

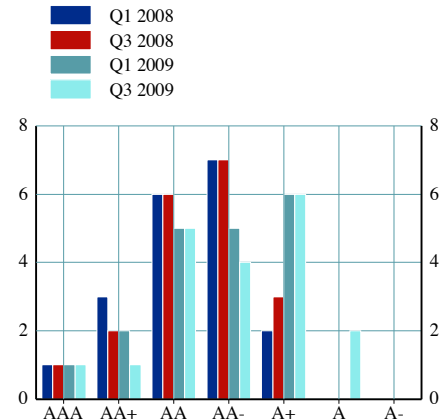
(Q2 2000 - Q3 2009; number)



Sources: Bloomberg and ECB calculations.  
Note: These include both outlook and rating changes.

**Chart S115 Distribution of ratings for large and complex banking groups in the euro area**

(number of banks)



Sources: Moody's, Fitch Ratings, Standard and Poor's and ECB calculations.

**Table S7 Rating averages and outlook for large and complex banking groups in the euro area**

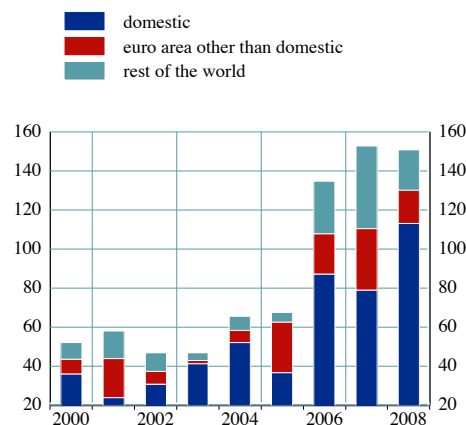
(October 2009)

|                                 | Moody's | S&P      | Fitch    | Total                |
|---------------------------------|---------|----------|----------|----------------------|
| Ratings available out of sample | 18      | 17       | 19       | 54                   |
| Outlook available               | 19      | 19       | 19       | 57                   |
| Rating average                  | Aa2     | AA-      | AA-      | 4.2                  |
| Outlook average                 | -0.6    | -0.4     | -0.2     | -0.4                 |
| Number of negative outlooks     | 1.0     | 1.0      | 1.0      | 3.0                  |
| Number of positive outlooks     | 12.0    | 8.0      | 5.0      | 25.0                 |
| Rating codes                    | Moody's | S&P      | Fitch    | Numerical equivalent |
|                                 | Aaa     | AAA      | AAA      | 1                    |
|                                 | Aa1     | AA+      | AA+      | 2                    |
|                                 | Aa2     | AA       | AA       | 3                    |
|                                 | Aa3     | AA-      | AA-      | 4                    |
|                                 | A1      | A+       | A+       | 5                    |
|                                 | A2      | A        | A        | 6                    |
|                                 | A3      | A-       | A-       | 7                    |
| Outlook                         | Stable  | Positive | Negative |                      |
| Numerical equivalent            | 0       | 1        | -1       |                      |

Sources: Moody's, Fitch Ratings, Standard and Poor's and ECB calculations.

**Chart S116 Value of mergers and acquisitions by euro area banks**

(2000 - 2008; EUR billions)

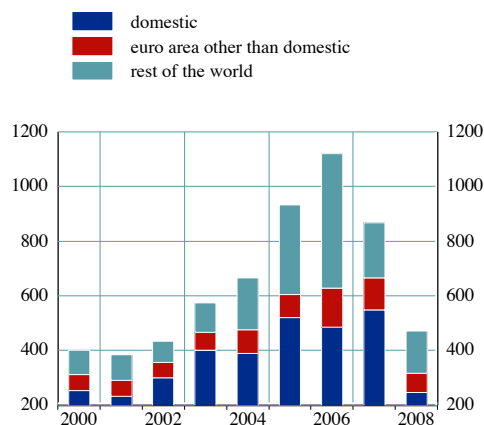


Sources: Bureau van Dijk (ZEPHIR database) and ECB calculations.

Note: All completed mergers and acquisitions (including institutional buyouts, joint ventures, management buyout/ins, demergers, minority stakes and share buybacks) where a bank is the acquirer.

**Chart S117 Number of mergers and acquisitions by euro area banks**

(2000 - 2008; total number of transactions)

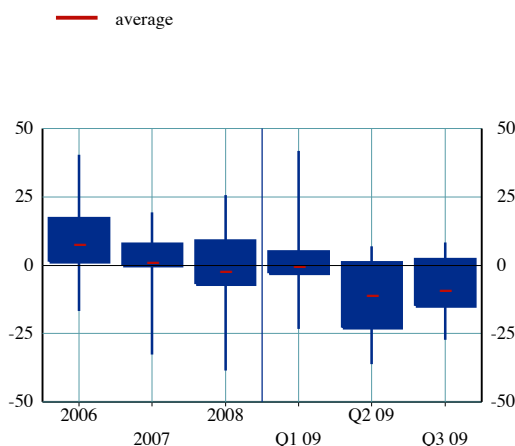


Sources: Bureau van Dijk (ZEPHIR database) and ECB calculations.

Note: All completed mergers and acquisitions (including institutional buyouts, joint ventures, management buyout/ins, demergers, minority stakes and share buybacks) where a bank is the acquirer.

**Chart S118 Distribution of gross-premium-written growth for a sample of large euro area primary insurers**

(2006 - Q3 2009; percentage change per annum; nominal values; maximum, minimum, interquartile distribution)

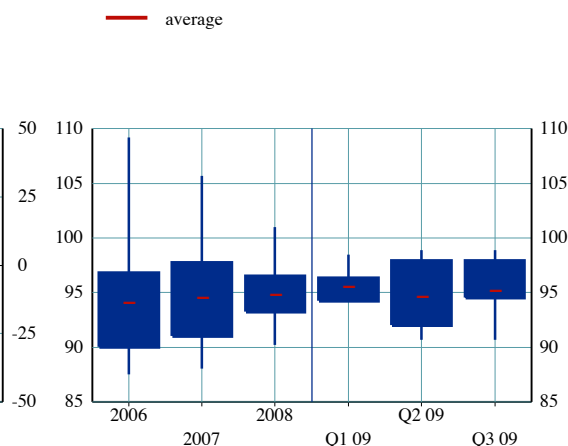


Sources: Bloomberg, individual institutions' financial reports and ECB calculations.

Note: Based on the figures for 20 large euro area insurers.

**Chart S119 Distribution of combined ratios in non-life business for a sample of large euro area primary insurers**

(2006 - Q3 2009; percentage of premiums earned; maximum, minimum, interquartile distribution)

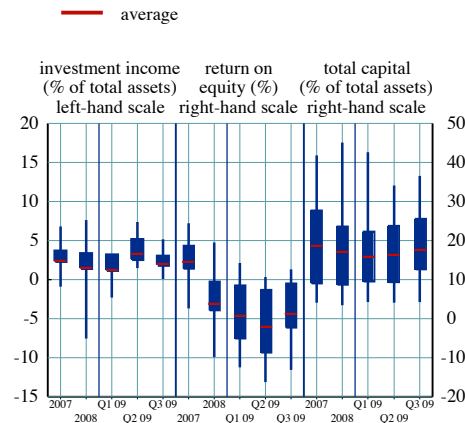


Sources: Bloomberg, individual institutions' financial reports and ECB calculations.

Note: Based on the figures for 20 large euro area insurers.

**Chart SI20 Distribution of investment income, return on equity and capital for a sample of large euro area primary insurers**

(2007 - Q3 2009; maximum, minimum, interquartile distribution)

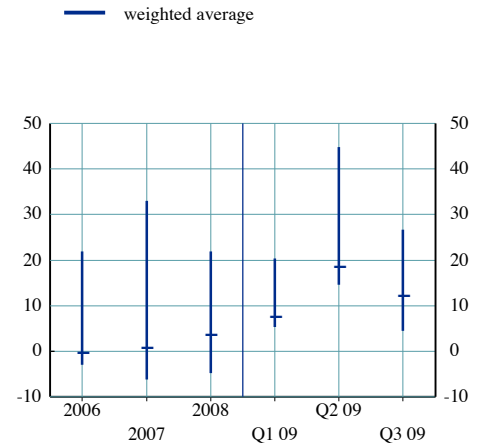


Sources: Bloomberg, individual institutions' financial reports and ECB calculations.

Note: Based on the figures for 20 large euro area insurers.

**Chart SI21 Distribution of gross-premium-written growth for a sample of large euro area reinsurers**

(2006 - Q3 2009; percentage change per annum; maximum-minimum distribution)

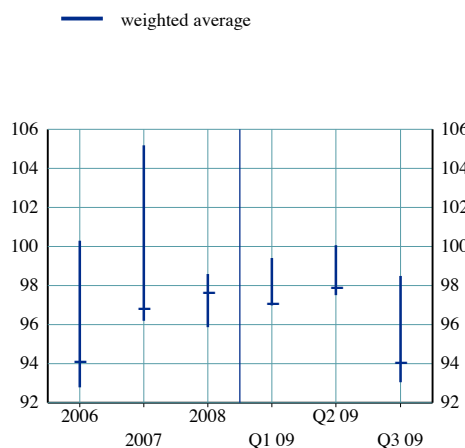


Sources: Bloomberg, individual institutions' financial reports and ECB calculations.

Note: Based on the figures for four large euro area reinsurers.

**Chart SI22 Distribution of combined ratios for a sample of large euro area reinsurers**

(2006 - Q3 2009; percentage change per annum; nominal values; maximum-minimum distribution)

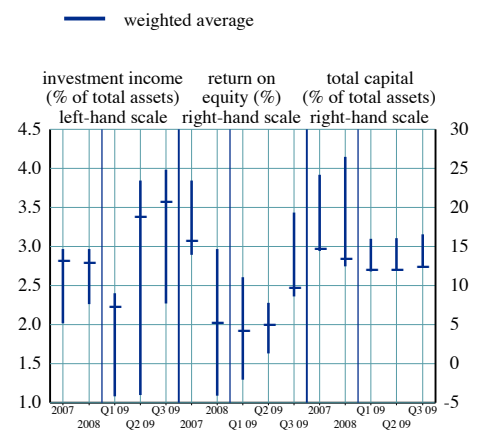


Sources: Bloomberg, individual institutions' financial reports and ECB calculations.

Note: Based on the figures for four large euro area reinsurers.

**Chart SI23 Distribution of investment income, return on equity and capital for a sample of large euro area reinsurers**

(2007 - Q3 2009; percentage of premiums earned; maximum-minimum distribution)

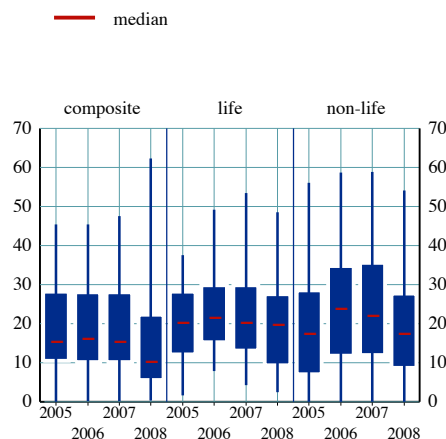


Sources: Bloomberg, individual institutions' financial reports and ECB calculations.

Note: Based on the figures for four large euro area reinsurers.

**Chart S124 Distribution of equity asset shares of euro area insurers**

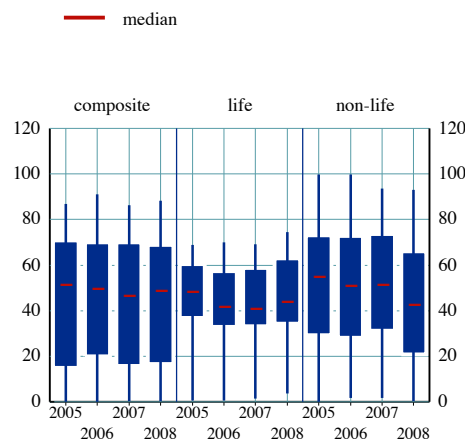
(2005 - 2008; percentage of total investment; maximum, minimum, interquartile distribution)



Source: Standard and Poor's (Eurothesys database).

**Chart S125 Distribution of bond asset shares of euro area insurers**

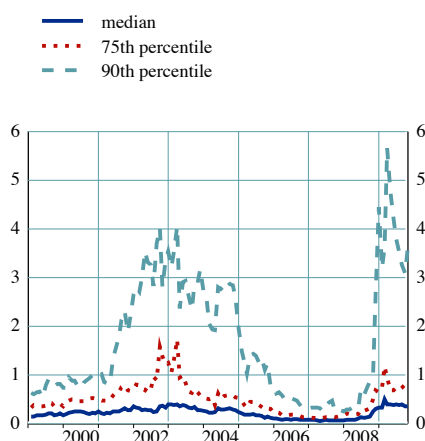
(2005 - 2008; percentage of total investment; maximum, minimum, interquartile distribution)



Source: Standard and Poor's (Eurothesys database).

**Chart S126 Expected default frequency (EDF) for the euro area insurance sector**

(Jan. 1999 - Oct. 2009; percentage probability)

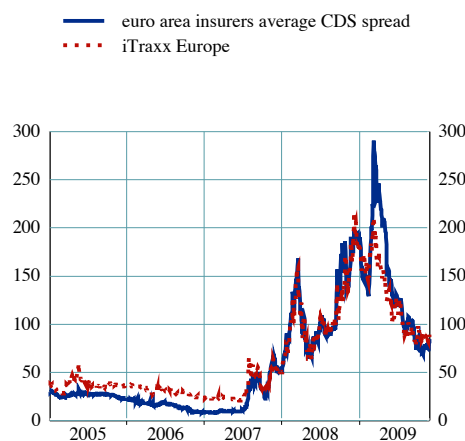


Source: Moody's KMV.

Note: The EDF provides an estimate of the probability of default over the following year. Due to measurement considerations, the EDF values are restricted by Moody's KMV to the interval between 0.01% and 35%.

**Chart S127 Credit default swap spreads for a sample of large euro area insurers and the iTraxx Europe main index**

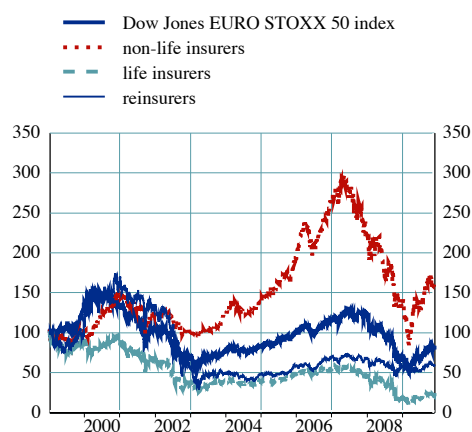
(Jan. 2005 - Nov. 2009; basis points; five-year maturity)



Sources: Bloomberg and ECB calculations.

**Chart S128 Dow-Jones EURO STOXX total market and insurance indices**

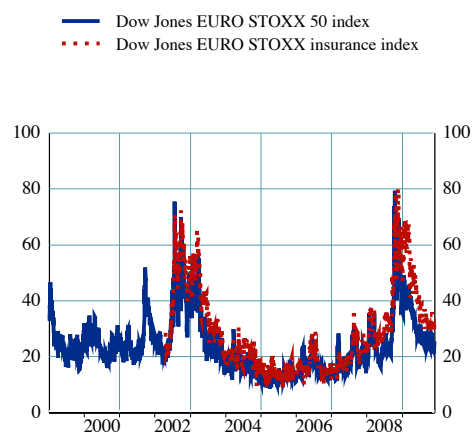
(Jan. 1999 - Nov. 2009; Jan. 1999 = 100)



Source: Thomson Reuters Datastream.

**Chart S129 Implied volatility for Dow Jones EURO STOXX total market and insurance indices**

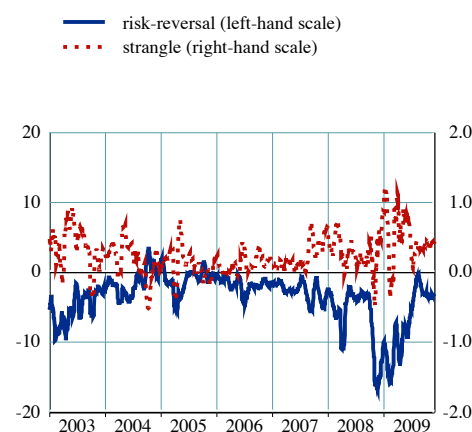
(Jan. 1999 - Nov. 2009; percentage)



Sources: Bloomberg and ECB calculations.  
Note: Weighted average of the volatility of the two closest options.

**Chart S130 Risk reversal and strangle of the Dow Jones EURO STOXX insurance index**

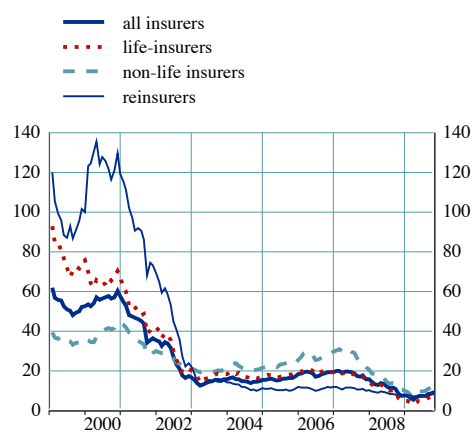
(Jan. 2003 - Nov. 2009; ten-years trailing earnings)



Sources: Bloomberg and ECB calculations.  
Notes: The risk-reversal indicator is calculated as the difference between the implied volatility of an out-of-the-money (OTM) call with 25 delta and the implied volatility of an OTM put with 25 delta. The strangle is calculated as the difference between the average implied volatility of OTM calls and puts, both with 25 delta, and the at-the-money volatility of calls and puts with 50 delta.

**Chart S131 Price/earnings (P/E) ratios for euro area insurers**

(Jan. 1999 - Oct. 2009; ten-years trailing earnings)

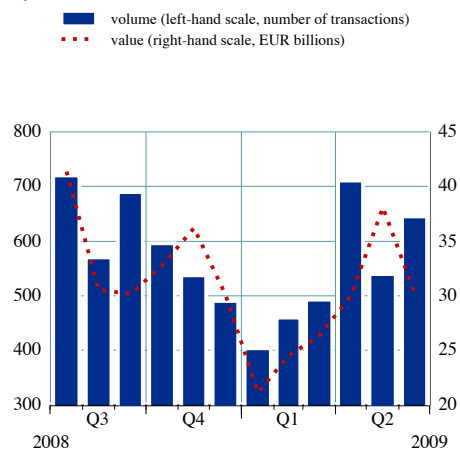


Sources: Thomson Reuters Datastream and ECB calculations.  
Note: The P/E ratio is based on prevailing stock prices relative to an average of the previous ten years of earnings.

## 6 EURO AREA FINANCIAL SYSTEM INFRASTRUCTURES

**Chart S132 Non-settled payments on the Single Shared Platform (SSP) of TARGET2**

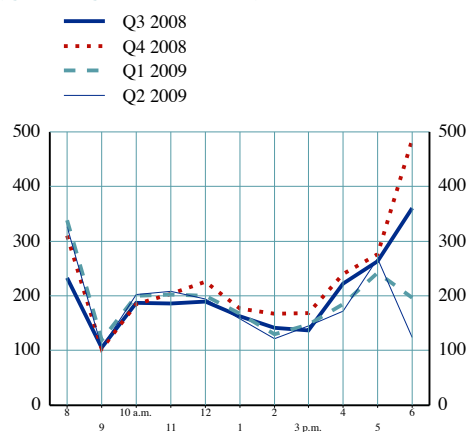
(July 2008 - June 2009)



Source: ECB.

**Chart S133 Value settled in TARGET2 per time band**

(Q3 2008 - Q2 2009; EUR billions)



Source: ECB.

**Chart S134 TARGET and TARGET2 availability**

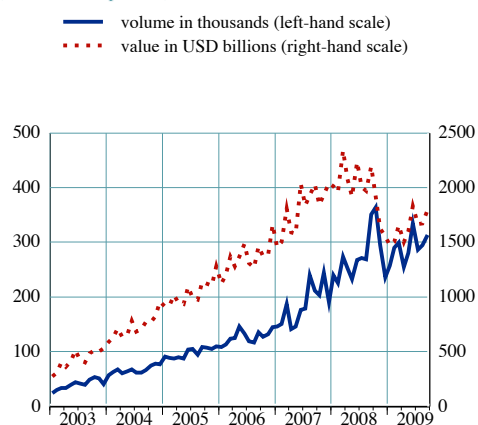
(Mar. 1999 - Sep. 2009; percentage; three-month moving average)



Source: ECB.

**Chart S135 Volumes and values of foreign exchange trades settled via Continuous Linked Settlement (CLS)**

(Jan. 2003 - Sep. 2009)



Source: ECB.

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