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# FINANCIAL STABILITY REVIEW

JUNE 2009


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## JUNE 2009

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*Unless otherwise stated, this document uses data available as at 29 May 2009.*

ISSN 1830-2017 (print)
ISSN 1830-2025 (online)

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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 mis-pricing 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 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 contribution by, 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[1]

The further significant deterioration of global macroeconomic conditions since the finalisation of the December 2008 Financial Stability Review as well as sizeable downward revisions to growth forecasts and expectations have added to the stresses on global and euro area financial systems. The contraction of economic activity and the diminished growth prospects have resulted in a further erosion of the market values of a broad range of assets. Connected with this, there has been a significant increase in the range of estimates of potential future write-downs and losses that banks will have to absorb before the credit cycle reaches a trough. Although there are great uncertainties surrounding such estimates of probable losses and of the outlook for banking sector profitability, the scale of estimates of potential write-downs has weighed on investors' confidence in the resilience of already-weakened financial institutions. Reflecting the challenges confronting the euro area banking sector, funding costs have remained elevated, the market price of insuring against bank credit risk has continued to be very high and the market value of many banks' equity has remained significantly below book value.

Large and complex banking groups (LCBGs) in the euro area have been responding to the challenging macro-financial environment by making efforts to de-leverage and de-risk balance sheets, although this has been hindered by the illiquid and stressed conditions that have characterised many financial markets. Banks have also been cutting costs and tightening credit standards on new lending. Recent surveys of bank lending practices indicate that those making lending decisions have been tightening their standards not only because of expectations of a further deterioration in the pace of economic activity, but also because of costs relating to the capital positions of their banks and difficulties in accessing wholesale funding markets.

The adjustment of bank balance sheets has entailed adverse feed-back on the market pricing of assets and on banks' financial intermediation role of channelling funds from savers to investors. The access of non-financial sectors to funding appears to have been hampered as a consequence, meaning that some investments and purchases either could not be undertaken or have been postponed, and economic output is incurring knock-on losses and declines. At the same time, in view of expectations of lower aggregate demand, credit growth has slowed, reflecting cut-backs in the perceived funding requirements of non-financial sectors. As revenue garnered from the provision of financial intermediation services is being eroded, this is adding to the stresses in the financial sector. Moreover, increasing signs of an adverse feedback loop between the real economy and the financial sector have posed new challenges for the safeguarding of financial stability.

Because of the continued stresses and impaired liquidity of many financial markets, a range of remedial policy measures have been taken both by central banks and by governments with the aim of preventing this adverse feedback and fostering the flow of credit. Central banks have taken numerous steps to meet the liquidity needs of financial institutions, including that of fully allotting all bids received in liquidity providing operations at preset policy rates, and widening of the lists of assets that are accepted as collateral for the provision of central bank liquidity. Central banks have also reduced policy interest rates to unprecedented lows, and have deployed unconventional monetary policy tools. At the same time, governments have created schemes to support depositor confidence and to ensure that banks can meet their funding requirements in capital markets. They have done this through a range of measures, including through the guaranteeing of bank liabilities, the injection of capital and, more recently, by relieving banks from the risks embedded in troubled assets, either through insurance schemes or by setting up dedicated asset management companies – also known as "bad banks".

1 This issue of the Financial Stability Review (FSR) describes the main endogenous and exogenous trends and events that characterised the operating environment of the euro area financial system over the period from 28 November 2008 (when the December 2008 FSR was finalised) until 29 May 2009.

There is a broad consensus that the remedial policy measures taken in the autumn of 2008 were successful in alleviating the exceptional stresses on financial systems that were triggered by the failure of Lehman Brothers. The significant narrowing of money market spreads over the past few months indicates that the central bank measures have contributed to improving the functioning of money markets. It is too early, however, to accurately assess the impact of the government measures on the longer-term funding and capital needs of the banks or, importantly, the extent to which they have contributed to fostering bank lending to the private sector. This is partly because the measures are taking time to implement and because euro area banks have been relatively slow to take up the support offered by governments. At the same time, hard-to-value assets have remained on bank balance sheets and the significant deterioration in the economic outlook has created concerns about the potential for sizeable loan losses. Reflecting this, uncertainty prevails about the shock-absorbing capacity of the banking system.

The next part of this section reviews the main sources of risk and vulnerability that are particular to the euro area financial system, and it discusses the remedial measures that have been taken both by the ECB and by national governments to stabilise the euro area financial system. This is followed by an examination of the main sources of risk and vulnerability that are present in the macro-financial environment. The section concludes with an overall assessment of the euro area financial stability outlook.

## SOURCES OF RISK AND VULNERABILITY WITHIN THE EURO AREA FINANCIAL SYSTEM AND REMEDIAL ACTIONS THAT HAVE BEEN TAKEN TO ADDRESS THEM

Stresses on euro area LCBGs intensified in the last quarter of 2008, with many of these key financial institutions reporting substantial losses for the period. Coming from record median returns on equity (ROE) of close to 20% in 2005 and 2006, the financial market turmoil steadily eroded their profits from the second half of 2007 onwards, to the point where they collectively reported a median ROE of close to zero for the full year 2008. Moreover, some of them reported heavy full-year losses. At the time of finalisation of this issue of the FSR, most euro area LCBGs had published statements on their first quarter 2009 financial performances. While the median ROE of this set of institutions was somewhat higher than in 2008, a number of institutions suffered sizeable losses.

As the impact of the financial market turmoil has been felt across a broadening range of economic sectors and economies, an increasing number of euro area LCBG business lines have suffered. Notwithstanding higher funding costs in the initial phases of the turmoil, the net interest income of euro area LCBGs held up reasonably well. This was also the case in 2008. However, in the course of last year and early 2009, the relative stability of this source of income became increasingly attributable to a widening of lending margins, which compensated for slower lending volume growth as lending standards were tightened. At the same time, fee and commission income suffered a dent in 2008, but it held up reasonably well in that year and in the first quarter of 2009. The turmoil initially had its greatest impact in the wearing down of LCBG profits through a continuous flow of write-downs of the values of portfolios containing complex credit products as their market or economic values sank. By end-May 2009, the accumulated portfolio losses absorbed by euro area LCBGs since the start of the turmoil had reached just over €100 billion, of which about €65 billion was reported in 2008. This was most visible in the collapse of trading income. At the same time, as the macro-financial environment took a turn for the worse in the latter part of 2008, a broad base of these institutions also began to see surging loan losses, which continued in the first quarter of 2009.

As the turmoil persisted and went through several waves of intensity, its impact was also felt in the cost and availability of a broadening range of LCBG funding sources. Challenges

surfaced first in raising new or rolling-over existing short-term unsecured debt in money markets, and in asset-backed commercial paper markets, as participants in these markets became increasingly worried about counterparty and credit risks in collateral. While swift action taken by the ECB to promote the orderly functioning of the money markets was largely successful in ensuring that counterparties were able to satisfy their short-term funding needs, it was not long before the costs and availability of longer and more durable sources of funding were adversely affected by credit risk concerns. The effective closure of asset-backed securities markets rendered securitisation of assets an unfeasible market financing option, although these securities could still be used in ECB refinancing operations.

Challenges confronting banks in accessing long-term wholesale funding were also quickly reflected in a shift of the maturity profile of new debt issuance towards shorter maturities. With an already relatively large stock of bank debt due to be rolled over in the next 18 months, this shift made some LCBGs increasingly vulnerable to the risk that they could be faced with stressed market conditions at the time of planned roll-over. In order to contain this risk, some institutions focused their funding strategies on increasing retail deposits, usually the most stable source of funding after equity finance. Indeed, a notable narrowing of the so-called customer funding gap – i.e. the difference between how much banks take in deposits and how much they lend out – for the euro area banking sector became evident after September 2008 when such risks became especially acute.

The erosion of LCBG profitability also meant that these institutions were unable to sufficiently increase their capital through the retention of earnings in order to alleviate the concerns of investors about their shock-absorbing capacities. This meant that they were forced to raise fresh equity capital in relatively challenging market conditions, characterised by sharply rising required rates of return on bank equity. While euro area LCBGs did manage to raise around €46 billion in new capital from private investors after the start of the financial market turmoil, this fell short of the amount they had to absorb from write-downs on portfolios containing structured credit products. However, taking account of the capital injected into euro area LCBGs by various governments, which has amounted to around €64 billion since the start of the turmoil, these institutions had, by the time of finalisation of this issue of the FSR, still raised slightly more capital than the losses they had absorbed.

The challenges banks were faced with in ensuring that their funding bases remained stable and diverse enough to cope with adverse disturbances caused EU governments to agree in October 2008 to implement measures designed to alleviate strains on their banking sectors. The main objectives of these public support schemes included the safeguarding of financial stability, the restoration of the provision of credit to the economy, the promotion of a timely return to normal market conditions, the restoration of the long-term viability of banks and the containment of the impact on the public finances, as well as the protection of taxpayers' interests, while preserving a level playing field in the single market. The forms these government support schemes have taken so far have included the guaranteeing of bank debt liabilities, recapitalisation measures and measures designed to relieve banks from the risks embedded in troubled assets.

In contrast to those in the United States, most of the government schemes in the euro area to support the financial sector have been voluntary. The take-up rate by financial institutions relative to the commitments made by governments has been diverse across all three types of measures and across countries. The schemes should be seen in a context where banks have been striving to improve their leverage ratios, which, all else being equal, would tend to favour new equity over debt issuance. Moreover, because banks are de-leveraging partly by scaling back on their lending, this implies a lower need for bond financing. On the positive side, the fact that bank issuance of bonds without such guarantees

has been very limited would tend to suggest that the availability of guarantees on bonds has been helpful for securing access to medium-term funding when needed. That said, market intelligence has revealed concerns among some banks about the high premium on guaranteed bank debt over government debt, possible stigma effects, as well as about the conditions sometimes attached to such guarantees.

The functioning of euro area money markets improved after the finalisation of the December 2008 FSR. This has been evident in a broad range of indicators, including that of a significant narrowing of spreads between short-term unsecured deposit rates and overnight index swap rates, a progressive lowering of the utilisation of the ECB's deposit facility by counterparties and a rise of overnight unsecured interbank transaction volumes. The improvement owed much to a range of measures taken by the Eurosystem that were aimed at restoring the functioning of the money market after the failure of Lehman Brothers in mid-September 2008. These measures included the introduction of a fixed rate tender procedure for the main refinancing operations, meaning that the Eurosystem fully allotted all bids received in the euro liquidity providing operations at a preset policy rate, the narrowing of the corridor between the standing facilities and an expansion of the list of assets eligible as collateral in Eurosystem credit operations. The significant compression of interest rate spreads in the euro area money markets would appear to suggest that market participants see short-term counterparty credit risks as having decreased considerably, possibly also on account of the government measures that have been taken. This notwithstanding, some banks have remained heavily dependent on central bank funding.

On 7 May 2009, a further set of measures, aimed at enhanced credit support, were announced. These measures encompassed (i) the introduction of liquidity providing longer-term refinancing operations with a maturity of 12 months, (ii) purchases of euro-denominated covered bonds issued in the euro area and (iii) granting the European Investment Bank counterparty status for the Eurosystem's monetary policy operations. Aimed at promoting a recovery in the term money and other funding markets, the announcement of these measures provided additional impetus to gradually improving conditions at the longer end of the money market maturity spectrum, whereas spreads narrowed in the covered bond market. Furthermore, the main ECB policy interest rate was reduced to 1% and the interest rate corridor between the standing facility rates was narrowed to ±75 basis points.

All in all, the efforts being made by banks to de-leverage and de-risk their balance sheets, as well as the measures that have been taken by the ECB and national governments of euro area countries, should, all else being equal, enhance the shock-absorbing capacities of euro area banks and lessen their funding risks. Indeed, the median leverage ratio – measured as the weighted average of assets relative to Tier 1 capital – of euro area LCBGs declined from 37 in 2007 to 33 in 2008, while the median Tier 1 and total capital ratios edged up slightly from 7.8% and 10.5% respectively in 2007 to 8.2% and 12.2% in 2008. Moreover, the quality of capital also improved and lending margins widened. Against this background, the stock prices of euro area LCBGs rebounded from March onwards, and their CDS spreads narrowed substantially, which brought these securities prices back to the levels prevailing at the time of finalisation of the December 2008 FSR.

That said, a number of sources of risk and vulnerability that are internal to the banking system can be identified. Among these vulnerabilities are capital buffers that do not appear to be sufficiently large in the eyes of market participants, hard-to-value assets that have remained on balance sheets and challenging prospects for improving profitability, as well as funding structures that have become increasingly and possibly too reliant on short-term borrowing via central bank liquidity operations. A number of these vulnerabilities could be revealed by a credit cycle downturn that proved to be more severe than currently expected.

Turning to large euro area insurers, these institutions also suffered a deterioration in their financial conditions in the second half of 2008 and the first quarter of 2009. Most of them reported drops in premium income, as falling equity prices and widening credit spreads lowered demand for life insurance products. At the same time, non-life insurance business lines were challenged by the deterioration of the economic environment, which lowered the demand of households and firms for their products. In addition, insurers endured a significant erosion of their investment income because of stresses in many of the financial markets in which they mainly invest, especially corporate bonds and equities. Insurers also reported write-downs on portfolios containing complex credit products. However, the scale of the reported losses was much smaller than that of LCBGs, thanks partly to the fact that insurers often retain such exposures over lengthy periods and classify them as "available for sale" in their balance sheets. This classification means that insurers do not have to report unrealised losses that are considered to be temporary through their profit and loss accounts. Instead, the losses result in commensurate declines in the value of shareholders' equity, and most insurers have thus far managed to avoid outright realised losses on their investment portfolios. That said, losses that have not been realised so far may have to be acknowledged in the period ahead if asset prices remain low for a prolonged period of time or if the credit cycle downturn triggers significant rating downgrades on the securities that insurers hold, which could force them to sell these assets, and thus realise the losses.

As did banks, albeit to a more limited extent, some insurers took action to mitigate the risks created by the challenging macro-financial environment. Capital positions were bolstered, also by cutting dividends, in some cases to zero. Some euro area insurers received capital injections from governments. In addition, hedging of equity and credit exposures was continued, and some insurers carried out significant outright sales of equities. Although some euro area insurers have reported lower solvency positions in recent quarters, available information suggests that, on average, their shock-absorption capacities are sufficient to weather the possible materialisation of the risks they currently face. Apart from the risks associated with the possibility of having to realise losses on their asset holdings, the main challenge confronting euro area insurers at present continues to be the combination of weaker economic activity, which is weighing on their underwriting performance, and the stresses in financial markets, which are inhibiting their capacity to generate investment income.

In euro area capital markets, long-term government bond markets were characterised by increased discrimination among investors towards different euro area sovereign issuers, in large part brought about by the intensified concerns about fiscal sustainability that were raised by substantial national financial rescue and economic stimulus packages. In particular, spreads widened most in those countries where government indebtedness was already relatively high or where the size of troubled financial sectors was large relative to the size of the economy concerned.

While there were some signs of an improved functioning of the corporate bond markets – including narrowing spreads and greater issuance of investment-grade corporate bonds – market liquidity remained impaired. This was indicated, for instance, by persistently wide so-called basis spreads – i.e. the spread between a corporate bond and the credit default swap premium on the corresponding entity – which were progressively wider the further down the issuer was in the credit quality spectrum. Although equity markets recovered some of the losses suffered in late 2008, valuations remained very low and volatility, while reduced, still remained relatively high. This continued to make it difficult and expensive for non-financial firms to issue equity. All in all, many indicators of market risk remained higher than at the time just before the demise of Lehman brothers. The persistence of these stresses in financial markets has left them vulnerable to the possibility of continued forced investment

portfolio unwindings by leveraged investors such as hedge funds, events which could be triggered by further investor redemptions from the sector and/or closures of hedge funds as a result of insufficiency in the scale of remaining capital under management following sizeable investment losses in 2008 and lacklustre investment performances in early 2009.

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

A broad-based and comprehensive financial stability assessment needs to be cognisant of sources of potential risks and vulnerabilities that are outside the control of participants in the euro area financial system. In this vein, a key source of concern is that downside risks to the global growth outlook increased significantly after the finalisation of the December 2008 FSR. Persistent economic weakness in the United States has added to the stresses on the US banking system that began with write-downs of the values of portfolios containing complex credit products, but have increasingly become related to losses on lending across a broadening range of exposures. While the rate of US house price declines appears, on the basis of futures prices, to be nearing a bottom, price declines and foreclosures might continue for some time to come. Furthermore, a significant upturn in default rates on corporate bonds is expected in the period ahead. If this credit cycle downturn in the United States were to prove more severe than currently expected, euro area banks could yet face additional losses on exposures to asset-backed securities. In addition, the possibility of further adverse feed-back between the US financial system and the real economy would most likely contribute to depressing confidence and private sector demand in the euro area.

From a euro area financial stability perspective, increasing stresses in some of the central and eastern European countries have become an additional area of concern. The overall exposure of the euro area financial system to the region is not particularly large. However, the distribution of exposures to the region is wide, with some euro area LCBGs having a significant share of their assets and profits connected with this region. This exposes them to the risk of a potential further deterioration in the economic situation there.

As regards the euro area non-financial sectors, risks to financial stability stemming from the euro area household sector have increased since the autumn of 2008, as households' capacity to service their debt may have weakened. In particular, households are facing higher income risks in a macroeconomic environment where downside risks to disposable income and unemployment have risen. At the same time, risks stemming from the likelihood of adverse house price developments remain significant, especially in those countries where house prices had previously been overvalued and where economic activity has been contracting. That said, the financial position of households in countries where borrowing takes place primarily at floating rates is likely to have improved. For the euro area non-financial corporate sector, the operating environment is expected to remain challenging for at least the remainder of this year. This has translated into expectations of sharply rising default rates. At the same time, conditions in the euro area commercial property markets are expected to remain weak until economic conditions improve and investor appetite for commercial property returns. Further losses on banks' exposures to commercial property lending and investment are therefore likely in the period ahead.

The vulnerabilities created by relatively high leverage among some euro area non-financial firms and in some parts of the household sector could be revealed by an economic downturn that is more severe than currently expected. Such developments, if they were to crystallise, could contribute to an increase in insolvencies, leading to losses on securities backed by European corporate loans and mortgage assets, as well as to an increase of loan losses for banks. In addition, the public finances in some countries appear to be vulnerable to the possibility of

spill-overs of stresses in both the financial and non-financial sectors.

## OVERALL ASSESSMENT OF THE EURO AREA FINANCIAL STABILITY OUTLOOK

The deterioration in the macro-financial environment has continued to test the shock-absorption capacity of the euro area financial system. The profitability of euro area LCBGs has been eroded and the prospects for a significant turnaround in the short term are not promising. These prospects weighed on investor confidence in the resilience of already-weakened financial institutions after the finalisation of the December 2008 FSR. Importantly, however, capital buffers have been rebuilt through mitigating actions taken by these LCBGs themselves, as well as through the injection of capital by governments, and the securities prices of these institutions have responded positively. However, the rebounds of these securities prices only brought bank share prices and CDS spreads back to the levels prevailing at the end of November 2008. At the time of the finalisation of this issue of the FSR, a number of market indicators continued to suggest that markets were not fully convinced that the buffers LCBGs have in place will prove sufficient to cope with the challenges and risks that lie ahead. This may well reflect persistently excessive risk aversion on the part of market participants, while it is also important to bear in mind that the impairment of liquidity across a range of financial markets has undoubtedly weakened their indicator properties.

Because capital buffers have been maintained well above the minimum regulatory requirements, most euro area LCBGs appear to be sufficiently well capitalised to withstand severe but plausible downside scenarios. However, there is a concern that many of the risks identified in this issue of the FSR could materialise if the global economic downturn proves to be deeper and more prolonged than currently expected. In particular, the main risks identified within the euro area financial system include the possibility of a further erosion of capital bases and a renewed loss of confidence in the financial condition of LCBGs, the possibility of significant balance sheet strains emerging among insurers and the possibility of more widespread asset price declines, coupled with high volatility. Outside the euro area financial system, important risks include the possibility of US house prices falling further than currently expected, the possibility of an even more severe than currently projected economic downturn in the euro area and the possibility of an intensification of the stresses already endured by central and eastern European countries.

All in all, notwithstanding the measures that have been taken by the Eurosystem and governments in the euro area to stabilise the euro area financial system and the recent recovery of the equity prices of most LCBGs, policy-makers and market participants will have to be especially alert in the period ahead. There is no room for complacency because the risks for financial stability remain high, especially since the credit cycle has not yet reached a trough. Banks will therefore need to be especially careful in ensuring that they have adequate capital and liquidity buffers to cushion the risks that lie ahead while providing an adequate flow of credit to the economy. Over the medium to longer-term, banks should undertake the appropriate restructuring to strengthen their financial soundness and resilience to shocks. This may well include adapting their business models to the challenging operating environment. At the same time, banks should be alert in ensuring that risks are priced appropriately, but not excessively or prohibitively so. The commitments made by euro area governments to support the financial sector have been sizeable across a range of measures. Given the risks and challenges that lie ahead, banks should be encouraged to take full advantage of these commitments in order to improve and diversify their medium-term funding, enhance their shock-absorbing capacities and protect sound business lines from the contagion risks connected with troubled assets.

# II THE MACRO-FINANCIAL ENVIRONMENT

## 1 THE EXTERNAL ENVIRONMENT

*The risks to euro area financial stability stemming from the external environment remained high after December 2008, on account of an unfavourable combination of several factors. In particular, continued, although somewhat lower, stresses in global financial markets inhibited deleveraging, created challenges for accessing funding and increased the cost of hedging for global institutions, leaving the latter with exposures to asset-backed securities. In addition, downside risks for US house prices prevailed and concerns rose in a number of countries about governments' fiscal positions and funding abilities against a background of large outlays for financial sector support measures and stimulus packages. At the same time, there was a broader worsening of the global macroeconomic environment and outlook which created financial strains among corporations and households, and this was also felt by banks through increasing loan losses. Furthermore, emerging economies suffered more significant economic downturns than previously expected, thereby putting strain on the balance sheets of financial institutions with exposures to these regions.*

### 1.1 RISKS AND FINANCIAL IMBALANCES IN THE EXTERNAL ENVIRONMENT

#### GLOBAL FINANCIAL IMBALANCES

Developments since the finalisation of the December 2008 Financial Stability Review (FSR) suggest that the risk of a market-led disorderly unwinding of global imbalances has started to materialise, although in a form that is different from that envisaged in previous releases of the FSR. In particular, an unexpected element in the adjustment is that it has been driven primarily by global deleveraging, the global economic slowdown and corrections in financial asset prices, rather than exchange rates.

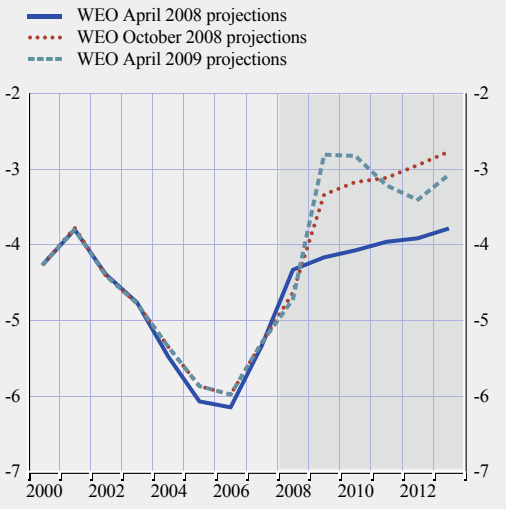
By late May 2009, the financial crisis was associated with a significant adjustment in current and financial account imbalances owing to the global recession, the falling prices of oil and other commodities, and a generalised retrenchment in private capital flows. According to the April 2009 projections of the International Monetary Fund (IMF), the current account deficit of the United States, which is the main deficit economy, was projected to decline to -2.8% of GDP in 2009, i.e. a deficit that is 1.5 percentage points smaller than was projected a year ago (see Chart 1.1).

As a counterpart to this adjustment, for the first time in a decade, Japan's current account surplus turned into a deficit in the fourth quarter of 2008. This resulted from falling external demand and the strengthening of the yen that followed the unwinding of carry trades from summer 2007 onwards. By April 2009, Japan's current account surplus was projected by the IMF to decline to 1.5% in 2009 and to 1.2% in 2010 (see Table 1.1).

Likewise, the combined surpluses of oil-exporting countries were also projected to decline significantly owing to the fall in oil prices, to less than 1% of GDP in 2009. At the same time, China's current account surplus was expected to remain high as the impact of declining external demand from mature economies on

**Chart 1.1 Expected path of adjustment of the US current account**

(2000 – 2013; percentage of GDP)




Source: IMF World Economic Outlook (various issues).

**Table 1.1 Current account balances for selected economies**

(2006 – 2010; percentage of GDP)

| | | | Projections | | |
|---|---|---|---|---|---|
| | 2006 | 2007 | 2008 | 2009 | 2010 |
| **Advanced economies** | **-1.3** | **-1.0** | **-1.1** | **-1.0** | **-1.0** |
| United States | -6.0 | -5.3 | -4.7 | -2.8 | -2.8 |
| Euro area | 0.1 | 0.4 | -0.7 | -1.1 | -1.1 |
| Japan | 3.9 | 4.8 | 3.2 | 1.5 | 1.2 |
| United Kingdom | -3.4 | -2.9 | -1.7 | -2.0 | -1.5 |
| **Emerging market economies and developing countries** | **5.0** | **4.1** | **3.8** | **1.6** | **2.1** |
| Developing Asia | 6.0 | 6.9 | 5.8 | 6.4 | 5.7 |
| China | 9.5 | 11.0 | 10.0 | 10.3 | 9.3 |
| Western Hemisphere | 1.5 | 0.4 | -0.7 | -2.2 | -1.6 |
| **Oil-exporting countries** | **15.8** | **12.4** | **13.0** | **0.4** | **3.2** |

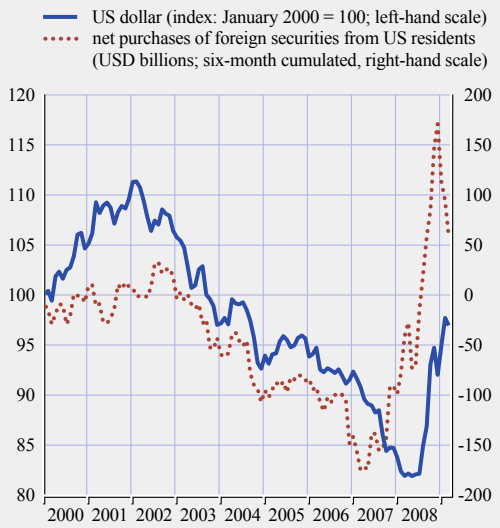
Source: IMF World Economic Outlook (April 2009 projections).

Chinese exports is expected to be partly offset by weaker domestic demand for imports.

Regarding global capital flows, net purchases by non-US residents of foreign portfolio securities held by US residents (i.e. US sales of foreign securities to foreigners) significantly increased after the collapse of Lehman Brothers, which coincided with a marked appreciation the US dollar in nominal effective terms (see Chart 1.2). This repatriation of capital to the United States and the flight-to-safety towards liquid US dollar-denominated financial assets caused the US dollar to strengthen in the first months following the cut-off date of the December 2008 FSR.

**Chart 1.2 Repatriation of capital to the United States and the US dollar nominal effective exchange rate**

(Jan. 2000 – Mar. 2009)




Sources: US Treasury International Capital System, Federal Reserve System and ECB calculations.

With the benefit of hindsight, global imbalances can be regarded as a proximate cause of the current crisis. In particular, not only were historically low financial risk premia a symptom of escalating systemic risks, but so too was the large scale of current account and financial imbalances. In this context, it is therefore essential to ensure that policy actions being taken to mitigate the impact of the crisis, although much needed, do not eventually steer global financial imbalances back to the unsustainable levels seen prior to the summer of 2007. Moreover, as highlighted in previous issues of the FSR, insufficient net capital inflows to the United States could lead to difficulties in funding its external deficits; particularly if confidence in US financial markets were to weaken on account of, for example, a further deterioration in the US economy or concerns raised by rising fiscal deficits.

## US SECTOR BALANCES

### Public sector

The Congressional Budget Office (CBO) estimated in March 2009 that the US federal budget deficit had increased to 3.2% of GDP in 2008, from 1.2% in 2007. According to the CBO's March 2009 outlook, and assuming that existing laws and policies remain unchanged, the deficit is expected to rise further to 11.9% of GDP in the 2009 fiscal year. The rising deficit reflects an expected drop in tax revenues and increased federal spending, in large part related to the government's actions to address the crisis in the financial and housing markets.

Most notably, the American Recovery and Reinvestment Act of 2009 (ARRA) budgeted for USD 787 billion over the period 2009-2019, or around 5.5% of GDP, to support economic recovery. The CBO estimates that the ARRA will

boost the level of US GDP by 1.4% to 3.8% in 2009 and by 1.1% to 3.4% in 2010. The long-term impact, however, is estimated at -0.2% to 0.0%.

Under an adverse scenario, the significant rise in the US federal fiscal deficit and debt could result in a downgrading of the US sovereign bond rating. If this were to occur, it could have important global financial stability implications through, for example, the impact on global bond yields. In this vein and despite the quantitative easing measures undertaken by the Federal Reserve System (see Section 1.2), the US Treasury yield curve has already steepened somewhat over the past three months, especially at longer maturities. This could partly reflect a pricing-in of higher risk premia into long-term bond yields by market participants in view of concerns about the increasing size of US sovereign bond issuance.

### Corporate sector

Overall, the outlook for the US corporate sector has weakened since the finalisation of the December 2008 FSR. Corporate profits fell further in the second half of 2008, with domestic profits being curbed by the ongoing stress in financial markets and by declining demand (see Chart 1.3). Both domestic profits and those from the rest of the world contributed to the decline on a year-on-year basis towards the end of the year, reflecting the global economic downturn.

In the second half of 2008, non-financial businesses began cutting back on investment expenditure, in the light of increased financing costs, uncertainty regarding the economic outlook and weakening demand. As a result, the financing gap, or the external funding needs, of US non-financial corporates fell to 0.7% of GDP in the second half of 2008, from 1.7% in the first half. In fact, on a net basis, corporations returned more funds than they raised from markets in the last two quarters of 2008. This resulted from a continued buying-back of equities (which had become an increasingly expensive source of financing, given the fall in stock markets), which more than offset the issuance of corporate bonds, commercial paper and bank credit (see Chart 1.4).

In line with the worsening economic outlook and the ongoing turmoil in financial markets, the strains on US non-financial corporate sector balance sheets intensified after the finalisation of

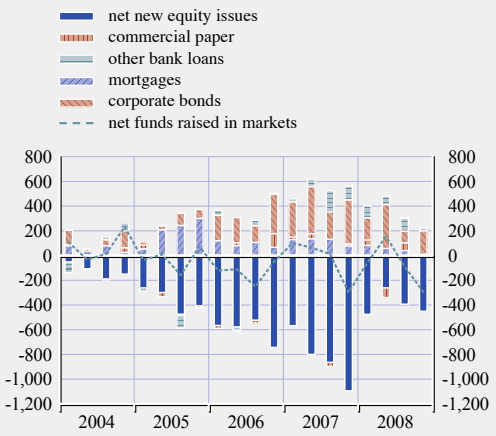
**Chart 1.3 US corporate sector profits**

(Q1 2003 – Q4 2008; percentage point contribution to year-on-year growth)


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 1.4 US non-financial corporate sector: net funds raised in markets**

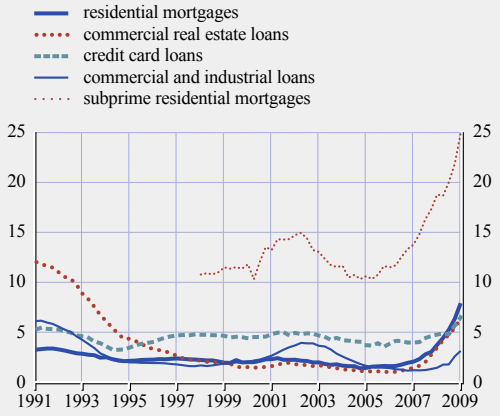
(Q1 2004 – Q4 2008; USD billions)




Source: Federal Reserve Board of Governors.

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

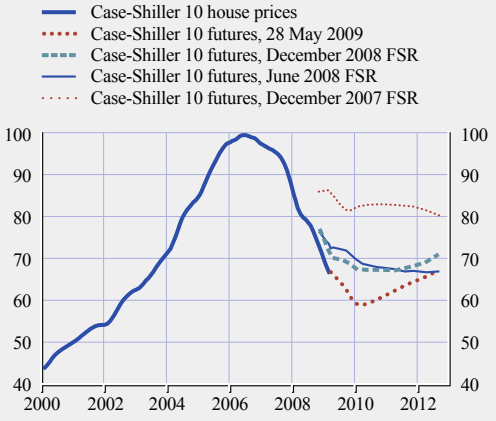
(Q1 1991 – Q1 2009; percentage)




Sources: Federal Reserve Board of Governors and Mortgage Bankers Association.

**Chart 1.6 US house prices and market expectations**

(Jan. 2000 – Sep. 2012; index: June 2006 = 100)




Sources: S&P/Case-Shiller and Bloomberg.

the December 2008 FSR. Continuing a trend that had begun in 2007, the ratio of debt to net worth of non-financial corporations increased further in the second half of 2008. A consequence of this has been a deterioration in the quality of loans extended by banks to non-financial corporations, as evidenced by an increase in delinquencies on commercial and industrial loans, although they remained below the peak reached in 2002 (see Chart 1.5). The turn in the corporate credit cycle is also reflected in the continued rise of speculative-grade corporate default rates since the end of 2007.[1] These rates are projected over the course of the next 12 months to reach levels far above the peaks of the early 1990s and 2001 (see Chart S3). Looking forward, the expected sharp increase in US speculative-grade-rated corporate defaults could exacerbate the funding problems of corporations.

### Household sector

After the finalisation of the December 2008 FSR, US private consumption, which had already been declining, fell significantly because of weak income growth, rising unemployment and a rapid deterioration in the balance sheets of US households. Total net household wealth declined by USD 7.8 trillion (or 13%) in the second half of 2008, driven by declines in both the real value of financial assets and housing wealth. As a result, the rise in net wealth relative to disposable income that took place between 2002 and 2007 was completely eroded. The outlook for household wealth depends partly on the future evolution of US house prices. According to the Case-Shiller futures price index for 10 major US cities, prices are still expected to fall by a further 12% from the levels prevailing at the time of finalisation of this FSR, before they bottom out by mid-2010 (see Chart 1.6).

The negative outlook for US house prices, however, is surrounded by a high degree of uncertainty, and weak fundamentals in the market weigh heavily on it. Regarding housing supply, estimates based on a simple statistical regression of the stock of vacant homes on the population suggest that the excess stock of vacant homes on the market is still considerable (see Chart 1.7). In addition, delinquency and foreclosure rates on mortgages increased further in the first quarter of 2009 (see Chart 1.5), with foreclosure sales adding to the excess supply of homes for sale. Regarding demand, while negative household sector fundamentals, along with tight credit

1 See Box 5, entitled "Corporate defaults: a likely source of further financial system stress", in Section 2.

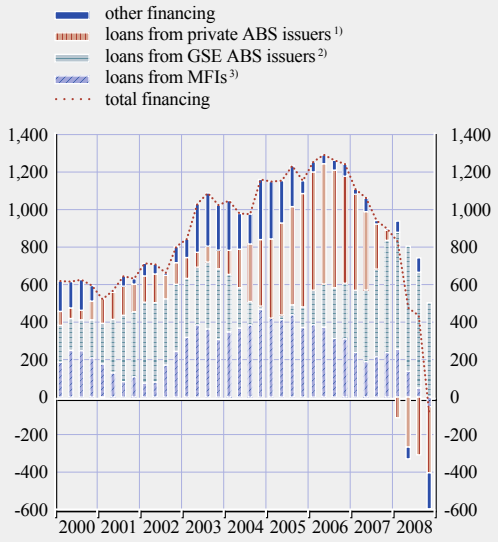
**Chart 1.7 Estimated US housing overhang**

(Q1 1965 – Q1 2009; thousands)


Sources: US Census Bureau and ECB calculations.

**Chart 1.8 Sources of household financing in the United States**

(Q1 2000 – Q4 2008; USD billions)




Sources: Federal Reserve System and ECB calculations.
1) Loans from private asset-backed security issuers.
2) Loans from government-sponsored enterprises (GSEs) and from agency and GSE-backed mortgage pools.
3) Commercial banks, savings institutions and credit unions.

conditions, have weighed heavily on home purchases, demand appears to have stabilised at low levels in recent months. That said, housing affordability has improved substantially since the housing market downturn got underway, which should eventually revive demand.

The outlook for the US housing market will also depend on the effectiveness of policy measures in mitigating the housing downturn. Measures aimed at improving housing affordability and access to mortgages, such as the Federal Reserve System's programme for purchasing mortgage-backed securities (MBSs) issued by agencies, have already had a positive impact. Conforming 30-year mortgage interest rates have fallen by more than 100 basis points since the Federal Reserve System's announcement in November 2008 that it would purchase these securities, and spreads of long-term mortgage rates over government bond yields have also narrowed. The Homeowner Affordability and Stability Plan will also allow a larger number of borrowers with large loan-to-value ratios to access these lower mortgage rates. There is a risk, however, that other measures, such as plans for mortgage modifications, will prove less effective, possibly delaying but not avoiding defaults. According to the Office of the Comptroller of the Currency and the Office of Thrift Supervision, more than 19% of loans modified in the first quarter of 2008 were delinquent within 60 or more days, or in foreclosure after three months. That rate rose to nearly 37% after six months.[2]

Turning to the liabilities side of US households' balance sheets, the total financing flow of US households turned negative in the fourth quarter of 2008. This was driven by a decline in net borrowing on home mortgages and consumer credit. Household financing was solely supported by government-sponsored enterprises (GSEs) through issuance of asset-backed securities (ABSs), as the supply of bank loans and loans from private ABS issuers dried up

2 See Office of the Comptroller of the Currency, Office of Thrift Supervision "OCC and OTS Mortgage Metrics Report Third Quarter 2008", Washington, D.C., December 2008.

(see Chart 1.8). This highlighted the potential importance of the Term Asset-backed Securities Loan Facility (TALF) in reviving consumer credit, although falling demand also accounted for part of the decline. For instance, according to the April 2009 Senior Loan Officer Survey, respondents reported that demand for consumer loans continued to fall.

Looking ahead, the risk could materialise that a rising number of households in negative equity positions – i.e. a situation where the value of their homes is lower than the liabilities relating to them – will find it optimal to foreclose on their mortgages. If it does, this would tend to put further downward pressure on house prices. Moreover, it is likely that credit losses will spread beyond the mortgage market; delinquencies on consumer loans and personal bankruptcies have already risen. While the fiscal stimulus package and measures to stabilise the financial system should lead to some improvement, pressures on the global financial system emanating from the US household sector are likely to continue in the near term.

## REGION-SPECIFIC IMBALANCES

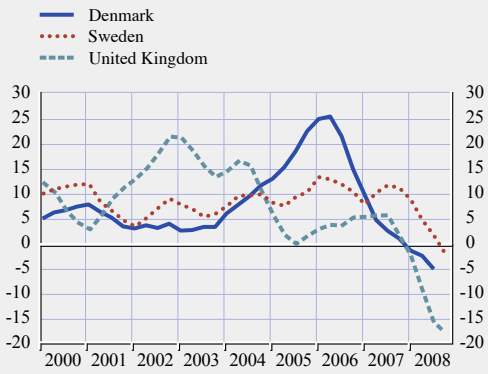
### Non-euro area EU countries

Pressures on the financial systems of EU countries outside the euro area have intensified since the December 2008 FSR was finalised, although there are substantial differences across countries.

In the United Kingdom, Sweden and Denmark, a deteriorating macroeconomic outlook has exacerbated strains in financial and credit markets. Banks have continued to restructure their balance sheets and remain reluctant to lend. The correction in house prices has been particularly severe in the United Kingdom, although house prices have also fallen in the other large non-euro area countries (see Chart 1.9). Several governments have announced measures to reinforce the stability of the financial system and to support the supply of credit to the private sector. The UK government, for example, announced a package in January 2009, which included the establishment of an Asset Purchase Facility, aimed at increasing the availability of corporate credit.

**Chart 1.9 Residential property prices in Denmark, Sweden and the United Kingdom**

(Q1 2000 – Q4 2008; percentage change per annum)




Source: National central banks.

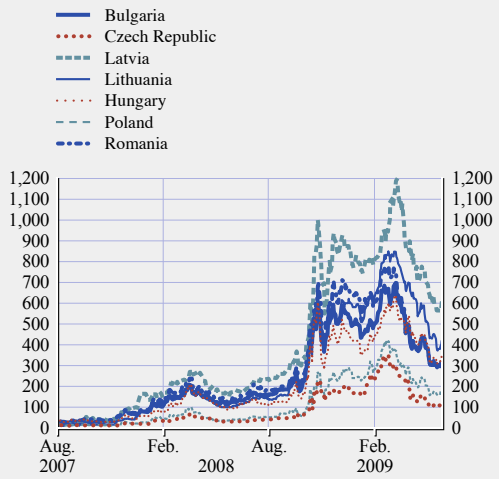
In central and eastern Europe, macroeconomic and financial conditions deteriorated particularly sharply, and some countries sought international financial assistance.[3] The international financial turmoil has affected many countries in the central and eastern European (CEE) region, via a weakening of international trade and through a disruption of capital inflows. These economies were highly vulnerable to a reduction in capital flows, as their economic expansion had, to a great extent, been financed by external borrowing. Some countries had, however, accumulated large external and internal imbalances.

Reflecting deteriorating macro-financial conditions, growth in credit to the private sector fell rapidly in many CEE countries, leading to a vicious circle between weakening economic activity and deteriorating asset quality. Moreover, in the first few months of 2009, stock prices continued to decline, currencies weakened further, and interest rate and credit

3 Hungary, Latvia and Romania received financial assistance from the EU (Medium-Term Financial Assistance Facility) and the IMF (Stand-By Arrangement). In addition, Poland was granted access to the IMF's precautionary Flexible Credit Line.

**Chart 1.10 Sovereign credit default swap spreads of new EU Member States**

(Aug. 2007 – May 2009; basis points, five year maturity)




Source: Thomson Financial Datastream.

default swap spreads increased, especially in economies with large macroeconomic imbalances (see Chart 1.10). After March, however, these trends were reversed somewhat, as the implementation of various measures eased concerns. A further risk to financial stability stems from the fact that the household and corporate sectors in several central and eastern European countries have built up large foreign exchange exposures in recent years, resulting in a high vulnerability to currency depreciations.

Looking ahead, a further weakening of macroeconomic conditions and declining asset prices may entail a deterioration in the quality of loan portfolios among banks in, or exposed to, non-euro area EU countries. In economies with large foreign currency exposures, further currency depreciations could result in severe loan losses, eroding the capital and asset quality of parent banks and their subsidiaries. In some central and eastern European countries, these risks could be amplified by a further decline or reversal in capital flows or further increases in market interest rates. In addition, financial linkages between parent banks and their subsidiaries could lead to possible feedback loops between central and eastern European countries and the euro area, for example, if the deteriorating financial positions of subsidiaries in central and eastern Europe bring about spill-over effects for the parent banks' liquidity and capital positions.

### Emerging economies

Macroeconomic conditions in emerging economies continued to worsen significantly after the finalisation of the December 2008 FSR, reflecting the confluence of weaker external demand, tighter financing constraints and falling commodity prices. Until the autumn of 2008, concerns had mainly focused on the transmission of the financial turbulence from mature to emerging economies. Since then, however, attention has shifted, reflecting a slowdown in capital inflows and the downward revision of growth forecasts, in particular on account of the significant exposure of euro area financial institutions to the new EU Member States and EU neighbouring countries (see the preceding section on non-euro area EU countries).

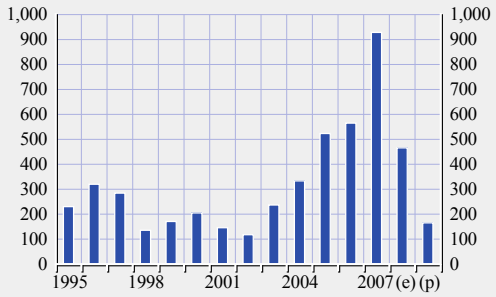
Emerging economies faced acute external financing pressures amid mounting concerns of a possible "sudden stop" in capital flows, although these pressures eased somewhat after March 2009.[4] According to the International Institute of Finance, net private capital flows were projected in early 2009 to reach USD 165 billion in 2009, about a third of the amount recorded in 2008 and barely 20% of the flows recorded in the peak year of 2007 (see Chart 1.11).

Some of the most vulnerable of the emerging economies – including Belarus, the Ukraine, Serbia and Pakistan – turned to the IMF for loan arrangements to help close significant external financing gaps. As the global crisis could force more countries to seek international financial support, G20 leaders provided a strong response at the London summit on 2 April 2009 to

4 Many economies, however, took initiatives to cope with possible "sudden stops" in capital flows, including the conclusion of foreign currency swaps, using foreign exchange reserves to provide liquidity to banks and calling on the IMF for financial support.

**Chart 1.11 Net private capital flows to emerging economies**

(1995 – 2009; USD billions)




Source: The International Institute of Finance, Inc.

address the retrenchment in private capital flows to emerging economies. Inter alia, they pledged to increase IMF resources by USD 500 billion and resources available to multilateral development banks by USD 100 billion. Looking ahead, continued global deleveraging, increasingly large public borrowing needs in mature economies and rising home bias could weigh further on emerging economies' access to international capital markets. Risks are largest for economies that rely heavily on these markets to finance current account deficits or to fund the activities of their financial or corporate sectors.

More specifically, in south-eastern Europe and other EU neighbouring countries, such as the Ukraine, strains on local banking sectors have increased significantly since the release of the December 2008 FSR, owing to falling securities prices and an eroding funding base from domestic deposits. The economic slowdown and balance sheet effects of significant exchange rate depreciations were also expected to lead to large increases in non-performing loans. An additional factor that could further amplify the negative feedback loop between the financial sector and the real sector in the region was the repatriation of capital by foreign – including euro area – branches or affiliates back to their parent banks, although the latter also expressed their commitment to the region. This might, in turn, have an adverse impact on the availability of domestic credit in these countries, the real economy and credit quality, and ultimately, on the earnings of foreign banks.

Overall, macroeconomic risks identified in past issues of the FSR, resulting from a reduced contribution of emerging economies to global demand, along with euro area financial institutions' exposures to these economies, have partly materialised, probably to a greater extent than initially anticipated.

## 1.2 KEY DEVELOPMENTS IN INTERNATIONAL FINANCIAL MARKETS

### US FINANCIAL MARKETS

#### The money market

The conditions of extreme stress that prevailed in the US interbank market following the collapse of Lehman Brothers eased considerably after the finalisation of the December 2008 FSR. Indications of this included a tightening of US dollar Libor overnight index swap (OIS) spreads and sizeable reductions in other money market spreads. These improvements were in part due to the "credit easing" measures adopted by the Federal Reserve System – including the establishment of various credit facilities and the enhancement of some existing schemes – which resulted in a significant increase in the size of its balance sheet.

Some of the Federal Reserve programmes were aimed at providing liquidity directly to the banking sector in the United States and abroad (through central bank liquidity swaps), while others were targeted at systemically important money market segments. The Commercial Paper Funding Facility (CPFF) and the Asset-backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) contributed to a reduction in commercial paper spreads.

Outflows from US money-market mutual funds (MMFs), the major supplier of short-term unsecured funding to financial institutions, abated after the steep retrenchment that followed the failure of Lehman Brothers, and inflows

resumed towards the end of 2008. A substantial share of these inflows was invested in less risky instruments, such as government or agency securities, rather than in the more traditional MMF instruments, such as commercial paper.

After mid-March 2009, money market conditions continued to improve, supported by a general decline in risk aversion across all markets and the announcement of the results of stress tests of major US banks in early May.

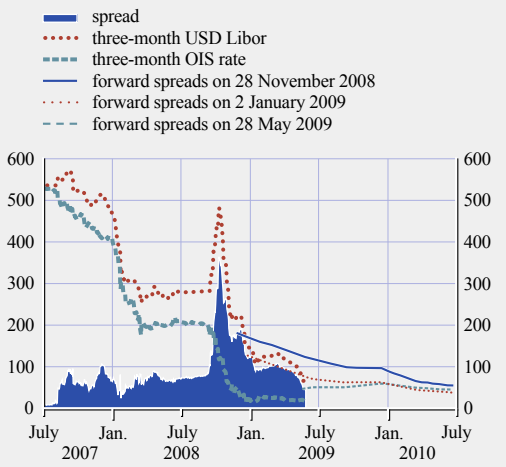
The narrowing of the Libor-OIS spreads, which was initially most pronounced at shorter maturities, extended to the longer tenors, and spreads for all but the 12-month maturity returned to the levels prevailing prior to the collapse of Lehman Brothers. Yet, by the end of May, the spreads for maturities beyond one month remained elevated in comparison with the pre-turmoil situation, signalling that stress levels in the market still remained high, and the balance of risks remained tilted towards the upside. In fact, spreads continued to wax and wane with bouts of risk aversion and concerns regarding the balance sheet conditions of international banks.

Access to US dollar funding by non-US financial institutions improved, albeit very gradually, after the finalisation of the December 2008 FSR. This was reflected in a diminishing use of USD swap lines between the Federal Reserve System and other central banks, and better liquidity conditions in the foreign exchange swap market.

Conditions in the US commercial paper market remained weak over the past six months. Indications of this included continued declines in outstanding amounts of commercial paper while demand for asset-backed commercial paper failed to recover and even weakened further. The decline in the amounts outstanding of commercial paper was partly due to issuers tapping other sources of funding, such as FDIC-guaranteed debt issuance, and the reduced short-term funding needs, reflecting deleveraging in the case of banks and slowing economic growth in the case of non-financial issuers.

**Chart 1.12 Current and forward spreads between USD LIBOR and overnight index swap (OIS) rates**

(July 2007 – July 2010; basis points)




Source: Bloomberg.

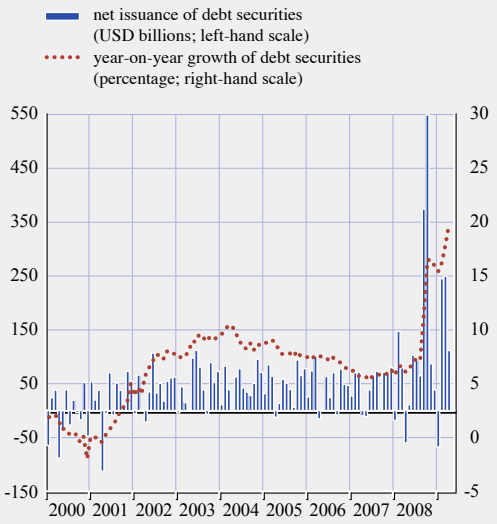
Looking ahead, at the time of finalisation of this FSR, forward Libor-OIS spreads continued to reflect expectations of spreads remaining at elevated levels until the end of 2009 (see Chart 1.12). The US money market remains susceptible to a further rise in risk aversion and negative developments in the banking sector, although these risks have decreased substantially as a result of the broad range of measures taken by the Federal Reserve System.

### Government bond markets

US government bond yields were very volatile after the finalisation of the December 2008 FSR (see Chart S24). In late 2008, Treasury yields fell considerably, when the target range for the federal funds rate was reduced to 0 to 0.25%. In early 2009, however, long-term yields started to increase again. The rise was partly due to concerns about the implications of the announced policy measures for the government's financing needs and uncertainty regarding their likely effectiveness (see Chart 1.13). Growing concerns about the US fiscal burden were also reflected in a considerable increase of credit default swap spreads for US Treasuries (see Box 1).

**Chart 1.13 Public debt securities issued by the US Treasury**

(Jan. 2000 – Apr. 2009)




Sources: US Treasury and ECB calculations.

There were some countervailing influences on the overall rise in long-term bond yields at the beginning of 2009. In particular, indications of a very slow recovery of the US economy, and of some US financial institutions, triggered flight-to-safety flows into the US bond market. Additional downward pressure on bond yields came from the decision of the Federal Reserve System in mid-March to buy up to USD 300 billion of longer-term Treasury securities in an effort to enhance conditions in credit markets. Nevertheless, by late May 2009, long-term bond yields had climbed above the levels observed in late November 2008, thereby contributing to a steepening of the yield curve. This increase can be mainly attributed to some reversal of the previous flight-to-safety flows after March 2009, owing to improvements in market sentiment, which were also reflected in a contemporaneous rebound of equity markets. Market uncertainty, as measured by implied bond market volatility, declined substantially from the historical peak reached in late 2008, but showed some pronounced intra-period swings.

Looking ahead, the outlook for US government bond yields continues to be uncertain, in part owing to the overall impact of policy measures. Although further purchases of Treasuries by the Federal Reserve System may help to stabilise or reduce long-term government bond yields, upside risks for yields could stem from the deterioration in the fiscal deficit. In addition, a durable recovery of market confidence could lead to a further unwinding of flight-to-safety flows and a corresponding increase in government bond yields.

**Box 1**

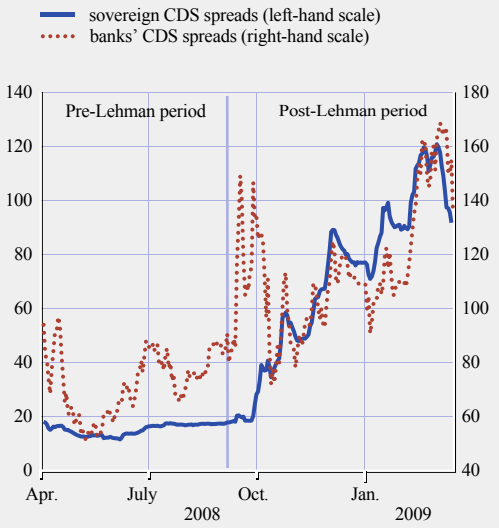
## LINKS BETWEEN GOVERNMENTS' AND BANKS' CDS SPREADS IN THE EURO AREA IN THE PERIODS BEFORE AND AFTER THE FAILURE OF LEHMAN BROTHERS

In the period following the collapse of Lehman Brothers, two notable differences arose in euro area sovereign CDS spreads: first, euro area governments' CDS spreads rose above their long-run averages and began to co-move closely with the CDS spreads of investment-grade euro area banks (see Chart A); second, divergences across euro area governments' CDS spreads grew, possibly reflecting differences in the financial cost implications of individual government support measures for local banking sectors across euro area countries as well as disparities in exposures towards emerging markets as well as central and eastern European countries. This box examines the links between the CDS spreads of governments and banks, and explores the determinants of sovereign spreads in the euro area.

Different patterns in the co-movement of banks' and sovereign CDS spreads before and after the default of Lehman Brothers were confirmed empirically within a bivariate time-series framework – a vector autoregression (VAR) of daily iTraxx senior CDS spreads of euro area banks and a weighted average of euro area sovereign CDS spreads for the period between March 2008 and April 2009. During this timeframe, prior to the failure of Lehman Brothers, government CDS spreads moved independently of banks' spreads, but they responded to movements of CDS spreads of banks in the period following the collapse of this institution.[1] The co-movement after the failure of Lehman Brothers is most probably explained by risk transfer: the risk between banks and sovereign risk converged as governments implemented support schemes and other measures aimed at recapitalising euro area banks and easing their access to various funding sources (and thereby reducing their CDS spreads). This had the effect of increasing the expected indebtedness of euro area governments (and thereby increased banks' CDS spreads from that country) in a ratchet-like process. In particular, an adverse feedback between government and bank CDS spreads arose as governments provided support to their banking sectors, which impacted the support rating of individual banks. The rating of any entity, an important determinant of its CDS spread, is composed in part of a support rating – a judgement regarding a sovereign state's or institutional owner's ability to support that entity. As governments committed increasing resources to support measures, concerns emerged regarding their credibility in the face of a significant credit event, negatively impacting support ratings and pushing up bank CDS spreads.

**Chart A Euro area governments' and banks' CDS spreads in the periods before and after the failure of Lehman Brothers**

(Apr. 2008 – Mar. 2009; basis points)




Sources: Bloomberg, Fitch Ratings and ECB calculations.

To address this feedback between banks' and governments' indebtedness and CDS spreads, a VAR framework was developed with several determinants of government CDS spreads and debt.[2,3] Determinants of government CDS spreads included: investors' sentiment, gauged by Dresdner-Kleinwort's risk aversion measure; government bond yields (on five-year bonds); new net government debt issuance (to capture the difference between priced and matured government debt); and euro area banks' CDS spreads. Several distinct features of governments' CDS spreads before and after the failure of Lehman Brothers were detected by the analysis (see Chart B). First, in the period preceding the collapse of Lehman Brothers, net debt issuance was on a downward trend, indicating a gradual closing of the priced-matured debt gap while government CDS spreads and risk aversion remained low in the euro area. This changed significantly after the default of Lehman Brothers: risk aversion increased substantially, coupled with rising CDS spreads and an

1 In the vector autoregression (VAR) literature, the concept of Granger causality is used, in this case from banks' CDS spreads to governments' CDS spreads in the period following the collapse of Lehman Brothers. This was tested at the 95% confidence level.
2 A constant and trend were included in the VAR model. To ensure shocks were orthogonal, Cholesky decomposition of the variance-covariance matrix was undertaken.
3 On the basis of Akaike Information criterion, two lags were included in the VAR, together with constant and trend terms.

**Chart B Sovereign CDS spreads, risk aversion and net sovereign debt issued in the euro area in the periods before and after the failure of Lehman Brothers**

(Apr. 2008 – Mar. 2009)


Sources: Bloomberg, Dresdner Kleinwort and ECB calculations.

increasing gap between priced and matured government debt, which was used to a large extent to provide funding for banks.

In the period after the failure of Lehman Brothers, governments' CDS spreads reacted positively to both exogenous increases in risk aversion and increases in the priced-matured debt gap in the euro area. Both indicators suggest that the increase in investors' risk aversion was either related to some exogenous factor or reflected responses to increases in the amount of euro area government debt issued. The response of sovereign CDS spreads to a unit shock in bank CDS spreads confirmed the spiralling hypothesis from the bivariate setting: it was found to be significant and positive (a 1.25 unit increase resulted from a unit shock in banks' CDS spreads). In the same framework, the reverse was also found to be true: banks' CDS spreads react positively and significantly to an increase in governments' CDS spreads (a three-unit increase from a unit shock). These findings must, however, be considered with some caution. In the period after the collapse of Lehman Brothers, governments' CDS spreads were largely driven by the net amount of priced-maturing debt and decreasing government bond yields.

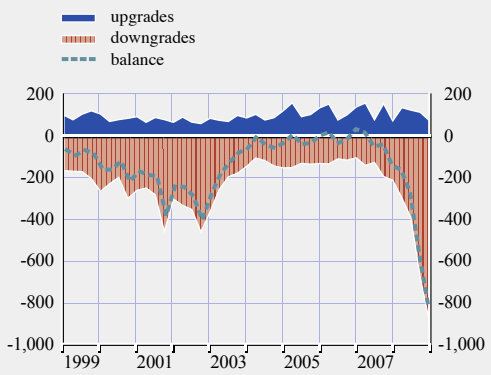
## Credit markets

After the finalisation of the last FSR, conditions in US credit markets remained stressed. The uncertain outlook for the financial industry and expectations of rising defaults across sectors resulted in very elevated corporate bond spreads and credit default swap (CDS) premia (see Chart S36). Expectations of further downgrades by credit rating agencies fuelled these tensions (see Chart 1.14).

Generally, however, conditions in the US corporate bond market improved markedly in early 2009, following severe disruption in the last quarter of 2008. Corporate bond issuance rose by 9% in the first quarter from a year earlier. Issuance was boosted by the clearance of a supply backlog from late 2008 and efforts by firms to reduce their dependence on bank financing. Some significant mergers and acquisitions in the pharmaceutical sector added further support to bond issuance. Elevated yields attracted investors to corporate bonds, in particular to those issued by firms with good credit ratings and non-cyclical activity. Sector discrimination increased,

**Chart 1.14 Corporate rating actions in the United States**

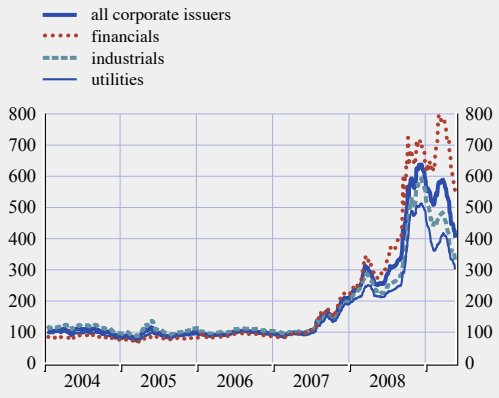
(Q1 1999 – Q1 2009; number)




Sources: Standard & Poor's and Bloomberg.
Note: This includes both the outlook and actual rating changes.

**Chart 1.15 US corporate bond spreads in various sectors**

(Jan. 2004 – May 2009; basis points)




Sources: Merrill Lynch and Bloomberg.

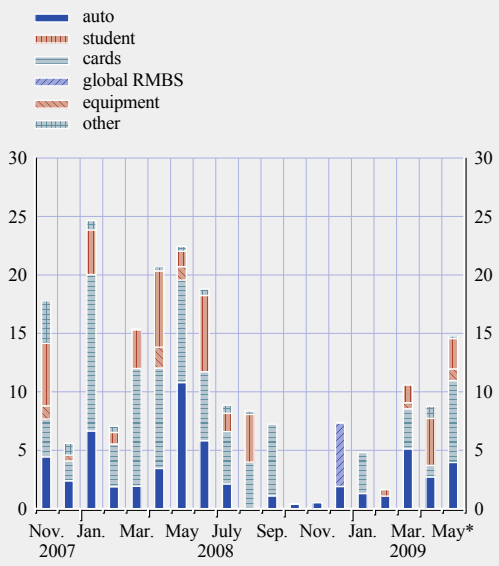
resulting in higher relative spreads in the financial and cyclical sectors (see Chart 1.15).

After the failure of Lehman Brothers in September 2008 and the subsequent deterioration in the condition of, and outlook for, global LCBGs, activity in the securitisation market came to a stand-still. By the end of April 2009, there had been little new securitisation of either residential or commercial mortgages. A more detailed analysis on the state of the securitisation market is provided in Box 2.

Nevertheless, since the beginning of 2009 there have been some early signs that the consumer and small business segments of the ABS market may be returning to normal. Following the introduction of the Term Asset-backed Securities Loan Facility (TALF) by the Federal Reserve System in December 2008, there were some new issuances of ABSs backed by credit card receivables, auto and student loans and also commercial mortgage-backed securities (CMBSs) by May 2009 (see Chart 1.16). The aim of the facility – which saw the New York Federal Reserve extend loans to investors in order to buy eligible ABSs – was to ease conditions in the US consumer and small business credit markets. The creation of this facility may have contributed to the significant tightening of the CDS spreads on eligible ABSs since the beginning of the year (see Chart 1.17 and Box 2).

**Chart 1.16 US public and private new issuance of asset-backed securities by type of collateral**

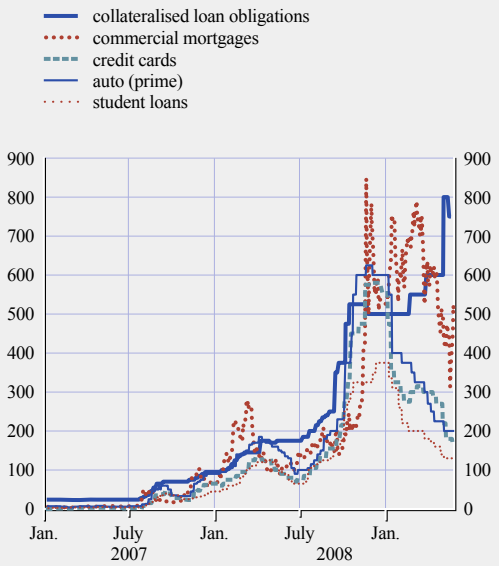
(Nov. 2007 – May 2009; USD billions)




Source: JP Morgan Chase & Co.
* Data up to 22 May.

**Chart 1.17 Credit default swap spreads on various US AAA-rated asset-backed securities and collateralised loan obligations in US dollars**

(Jan. 2007 – May 2009; basis points)




Source: JP Morgan Chase & Co.

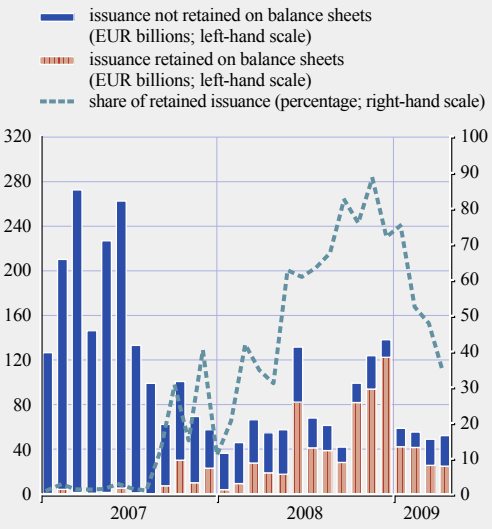
Box 2

## SECURITISATION AND THE CONDITIONS FOR ITS RESTORATION

There has been a dramatic reduction in securitisation activity since 2007. Although significant amounts of highly-rated securities have been issued by some banks, these have been retained for use as collateral for accessing central bank liquidity (see the chart). This mechanism has played a crucial role in providing banks with necessary liquidity and has stabilised the securitisation market. As the securitisation process can be regarded as an innovation which, if properly managed, contributes to welfare, its restoration is important for the functioning of the financial system.[1] This box explains why the securitisation market has frozen and explores the conditions that would be required to restore it, which may, in turn, contribute to an easing of credit market conditions.

**Securitisation in the global banking sector**

(Jan. 2007 – Apr. 2009)




Sources: Dealogic and ECB calculations.

Securitisation has been central to the originate-to-distribute model, whereby banks could re-use their capital by selling some tranches of securitised assets to external investors and funding some other tranches relatively cheaply via off-balance-sheet vehicles using short-term commercial paper. This business model, which involved substantial maturity mismatching, became an early victim of the crisis.

Banks and their off-balance-sheet conduits were the major buyers of securitised assets, accounting for as much as 70% of holdings of asset-backed securities (ABSs) before the turmoil erupted. The disappearance of conduits caused funding problems for banks as the demand for securitised assets faded away.

This was exacerbated by the forced deleveraging of the hedge fund industry and the impact of the crisis on insurance companies, which had typically been investors in the mezzanine tranches of securities. At the time of finalisation of this issue of the FSR, banks were not able to rely on securitisation as a source of funding, despite their need for wholesale funding.

An important reason for the loss of confidence in ABSs was the capital-drain effect resulting from the, sometimes multiple notch, downgrading of AAA-rated tranches of these securities. This first affected collateralised debt obligations and then some residential mortgage-backed securities (RMBSs) of lower quality. According to the practices adopted by rating agencies, the extent of credit quality deterioration seen on AAA tranches should not happen more frequently than once

1 Some studies suggest that securitisation may have facilitated access to credit markets for some borrowers, leading to a better utilisation of private projects and ideas contributing to economic progress.

per century. Therefore, investors initially had very high confidence in the security of the capital invested. However, once the values of these tranches began to erode across various asset classes and were subsequently downgraded, it became clear that the rating models had not taken all risks into account. The models assumed that the delinquency rates of sub-prime borrowers would not exceed a historical high of 15% and assumed that US house prices would not decline on a nation-wide basis. Risks related to sub-prime borrowing therefore seem to have been underpriced. As a result, fixed income products created from the cashflows of these mortgages could not meet their obligations. Moreover, conflicts of interest may have arisen as both originators and rating agencies may have had incentives to structure deals in a way that securities had a AAA-rating for the largest possible share of the portfolio pool. Furthermore, the cash flows of ABSs are determined by the ability of the creditors to repay, and the price reflects market participants' expectations about the future path of economic developments until the security matures. In particular, the expected unemployment rate, an important determinant of the ability of mortgage borrowers to repay their debts, strongly influences RMBS prices. Uncertainty about the severity and length of the current economic downturn, however, leads to uncertainty surrounding the assumptions underlying the pricing of securities, thus making it difficult to determine intrinsic values. The extreme uncertainty surrounding the fundamental value of securities has created a significant gap between the price demanded by sellers (mostly banks) and potential buyers.

For securitisation to resume, the above-mentioned obstacles must be overcome. First, uncertainty related to economic fundamentals, especially concerning the severity and length of recessions in mature economies, must decrease and expectations regarding future developments must converge. Importantly, the US housing market must stabilise, as this is crucial for pricing in the RMBS sector, the position of US household balance sheets, and thus the timing and strength of the economic recovery. Second, rating agencies' models need to regain credibility. Increased transparency in the assumptions behind the models, along with independence in the rating process, may increase investor understanding of these complex products and decrease perverse incentives. Furthermore, credit risk must be re-priced and credit margins increased to reflect underlying credit risks in order to improve the competitiveness of ABSs vis-à-vis other fixed-income products. Finally, the major pre-turmoil buyers, namely banks, must regain their purchasing power. Apart from the conditions described above, the burden of the portfolios of securities which remain on their balance sheets needs to be decreased. This can only happen when prices reach levels that will not precipitate further substantial write-downs. The prices of ABSs that prevailed around the time of finalisation of this FSR may have already become attractive to potential buyers of distressed assets, but financing these investments remained difficult. An easing of financing conditions for distressed assets and allowing for some leverage in this regard could encourage potential buyers to offer prices closer to those at which these assets are currently booked on banks' balance sheets.

The recent US Treasury Private-Public Investment Program could trigger sales of troubled assets from banks. Under the programme, the US government provides guaranteed debt, allowing buyers to employ leverage to buy these securities. This government-guaranteed leverage should allow buyers to bid prices higher.

Securitisation has been an important element in the development of modern financial systems that will doubtless recover in some form or another. Nevertheless, as this box has outlined, both private and public efforts are necessary to restore confidence and get the market working again.

The outlook for the US ABS market was boosted by the introduction of the Public-Private Investment Program (PPIP). This programme was designed to tackle the problem of existing portfolios of ABSs and CDOs which remained on banks' balance sheets and created an obstacle for extending new credit. Under this programme, investors are provided with US government-guaranteed loans to purchase troubled assets using leverage. Moreover, the TALF will be further extended to include additional residential mortgage-backed securities (RMBS) and commercial mortgage-backed securities (CMBS) as eligible assets.

Should both programmes prove successful, they will contribute to the easing of conditions on both the primary and secondary securitisation markets. Nevertheless, for full restoration of securitisation, further conditions must be met (see Box 2).

Looking ahead, US credit markets will remain sensitive to changes in market sentiment owing to persistent uncertainty about the condition of the financial sector and the broader economic outlook. In particular, corporate bonds may be penalised by possible "indigestion" of investment-grade bonds in the primary market. Increased sector discrimination may negatively affect the financial sector and other growth-related industries, which already face reduced access to bank financing. Finally, the outlook for securitisation will depend on the success of the US programmes aimed at restoring investor interest in those products.

**Box 3**

## COUNTERPARTY CREDIT RISK IN THE CREDIT DEFAULT SWAP MARKET

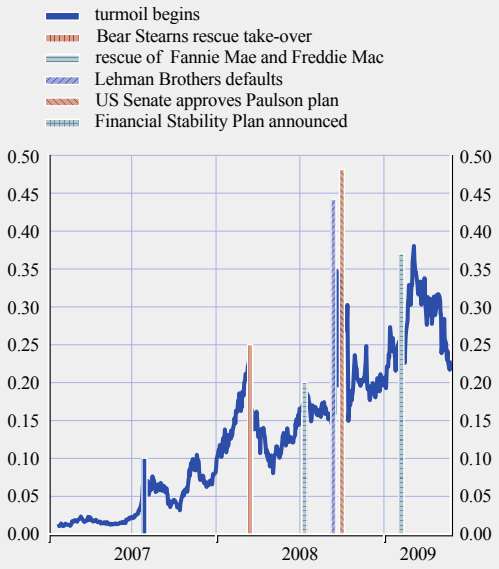
The failure of Lehman Brothers revealed that counterparty credit risk – the risk of default by a major credit protection issuer or dealer in the credit default swap (CDS) market – is non-negligible. This risk comprises the potential replacement costs of CDS contracts if troubled CDS market primary dealers were to default. From a financial stability perspective, such a default would not pose a systemic risk for the financial system if the resulting losses were low or widely distributed across dealers. If the default of one dealer, however, caused another to default or precipitated a cascade of defaults owing to a disorderly unwinding and settlement of CDS contracts, this would generate severe systemic consequences, not only for the CDS market, but also for the financial system as a whole. Against this background, this box introduces an indicator of counterparty credit risk in the CDS market and discusses some specific issues related to that risk.

To assess the risk that one dealer's default creates a cascade of defaults, the probability of at least two major CDS contract dealers defaulting simultaneously can be used. The $n^{th}$-to-default pricing model framework is useful in this regard.[1] Probabilities of default of major dealers were derived from CDS spreads and the pair-wise equity returns correlation matrix between dealers was used as a proxy for the default correlation matrix. The 19 largest dealers in the CDS market (mostly global LCBGs) were included, and the probability that two or more dealers default simultaneously over the next two years was calculated (see the chart).

1 For further details, see Box 14 in ECB, *Financial Stability Review,* December 2007. The methodology used follows R. G. Avesani, "FIRST: A Market-Based Approach to Evaluate Financial System Risk and Stability," *IMF Working Paper*, No 05/232, December 2005, and R. G. Avesani, A. Garcia Pascual, J. Li, "A New Risk Indicator and Stress Testing Tool: A Multifactor $N^{th}$-to-Default CDS Basket". *IMF Working Paper,* No. 06/105, April 2006.

**Indicator of counterparty credit risk in the CDS market**

(Jan. 2007 – May 2009; probability)




Sources: Bloomberg and ECB calculations.

The indicator shows that counterparty credit risk was highest during two episodes of market turmoil (the rescue of Bear Stearns and the default of Lehman Brothers). In the early months of 2009, the indicator increased again to levels last seen in mid-September 2008. This reflected the negative impact of the crisis on all major dealers in the CDS market via write-downs and heightened default correlations. Market intelligence also indicates that it resulted in wider bid-ask spreads and smaller individual transaction values in the CDS market. Following the implementation of various government support measures across mature economies, however, and the announcement of the results of stress tests on major US banks, market participants' risk perceptions regarding major global banks decreased somewhat, and this was reflected in the indicator in April and May.

In response to increased counterparty risk, several measures were taken: first, CDS market dealers entered multilateral terminations/ netting or "tear-ups" of CDS contracts, whereby CDS contracts from one dealer were offset in transactions with others. These transactions decreased notional gross exposures, operational risks and administrative costs, thereby reducing counterparty credit risk. In the course of 2008, dealers decreased their notional exposures to CDS contracts via "tear-ups" by USD 30 trillion of gross notional or half of the value of the CDS market and this continued into 2009 (a reduction of USD 2.5 trillion).[2] In spite of these efforts, the risks related to the CDS market appear to remain high, and may result from the ongoing stresses experienced by major CDS dealers.

2 TriOptima and DTCC data.

## Equity markets

US equity markets continued to decline in late 2008 and early 2009, driven by the worsening financial and economic situation (see Chart S26). Losses were particularly pronounced for the banking sector, where the lack of detail in the US Treasury's presentation of its Financial Stability Plan raised concerns. In mid-March 2009, however, stock indices rebounded strongly. Share prices surged, especially for the financial industry, in response to the positive first-quarter profit expectations of some US banks and the Treasury's announcement of the Public-Private Investment Program (PPIP). The better-than-expected results of the Supervisory Capital Assessment Program for major US banks also supported the rebound. At the end of May 2009, broad US stock indices stood close to the levels prevailing at the finalisation of the December 2008 FSR.

As from the end of November 2008, corporate earnings performances of US firms turned increasingly negative, putting additional downward pressure on equity prices (see Chart 1.18). Future earnings growth expectations for S&P 500 equity index companies were also revised strongly downwards. Looking at equity market valuation, the ten-year-trailing price-earnings (P/E) ratio for the S&P 500 declined

**Chart 1.18 Realised and expected earnings per share (EPS) growth for S&P 500 companies**

(Jan. 2001 – May 2009; percentage change per annum)


Sources: Thomson Financial Datastream and ECB calculations.

in early 2009 to levels close to the long-term historical average of around 15 (see Chart S29).

By late May 2009, near and medium-term implied stock market volatility, as derived from stock options, had declined substantially from the peaks of November 2008, but still remained somewhat heightened in comparison with pre-crisis levels, a sign of diminished but persistent uncertainty in US stock markets (see Chart S27). Nonetheless, according to several indicators, investors' risk aversion had moderated noticeably (see, for example, Charts S18 and S28).

Looking ahead, equity markets remain exposed to the impact of recent US policy initiatives, including the Treasury's PPIP and the Federal Reserve System's purchase of Treasury securities and agency mortgage-backed securities. Much will also depend on the future path of earnings developments and sentiment in the housing market.

## EMERGING FINANCIAL MARKETS

In the first months following the release of the December 2008 FSR, global deleveraging continued to markedly reduce international investor demand for emerging financial assets. By late May 2009, however, risk appetite had recovered somewhat. As a result, valuations improved partly after the significant correction that took place in the wake of the failure of Lehman Brothers. Between December 2008 and late May 2009, emerging market equity valuations gained about 35% (see Chart S39). The Emerging Market Bond Index Global (EMBIG) spread narrowed by close to 300 basis points and yields on long-term domestic bonds declined by almost 70 basis points.

Differences in performances across emerging market regions and asset classes, however, remained significant. By late May 2009, for instance, valuations of emerging European equities had gained about 20%, only two-thirds of the gains of emerging Asian equities. In particular, China's equity markets gained close to 35% between December 2008 and late May 2009, on hopes that the large fiscal stimulus adopted by the Chinese authorities would help the economy to be among the first to recover from the current downturn.

Moreover, in foreign exchange markets, several emerging market currencies, such as the Korean won, the Mexican peso or the Russian rouble, were subject to selling pressure as a result of massive capital outflows and deteriorating growth prospects in the first months following the release of the last FSR, but subsequently stabilised.

A growing concern after the finalisation of the last FSR was the possibility of indiscriminate selling and contagion across both emerging market countries and asset classes as international investors sought to rebalance their portfolios. Illustrative of such a view, for example, is the abrupt compression of a measure of dispersion of emerging market sovereign spreads over US Treasuries on several occasions in the early months of 2009 (see Chart 1.19).[5] Falls in this indicator are suggestive of indiscriminate market sell-offs to an extent greater than warranted by fundamental factors. That said, seen from a longer-term perspective, this measure of

5 The measure of dispersion of emerging market country spreads used here is the standard deviation. It is weighted by the EMBIG to account for the marked increase in the average level of spreads since the start of the financial turmoil. Results using the median of the sovereign country spreads are similar.

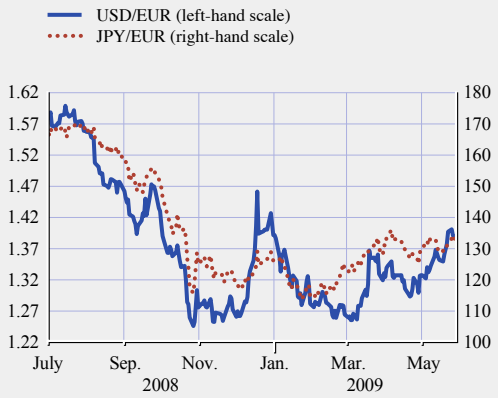
**Chart 1.19 Standard deviation of emerging market sovereign debt spreads over US Treasuries, divided by the EMBIG**

(Jan. 2007 – May 2009)


Sources: JP Morgan Chase and ECB calculations.

**Chart 1.20 Selected bilateral exchange rates**

(July 2008 – May 2009)




Sources: Bloomberg and ECB calculations.

dispersion tended to widen more or less continuously after the summer of 2008, which may point to higher discrimination across issuers, also supporting the view that spreads may better reflect differences in fundamentals than previously.

Looking ahead, one of the main risks confronting emerging financial markets is that continued global deleveraging could lead to further capital outflows and significant corrections in emerging financial assets. A stronger real economic downturn than currently expected in emerging economies could have similar adverse effects, suggesting that their financial markets remain a non-negligible source of market risk for euro area financial institutions.

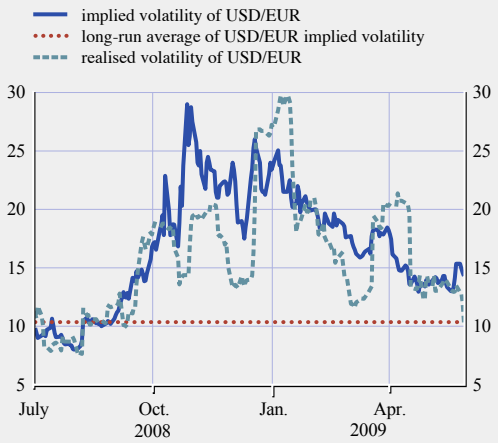
## FOREIGN EXCHANGE MARKETS

Between late November 2008 and end-May 2009, the euro appreciated in nominal effective terms, gaining around 6% vis-à-vis 21 important trading partners. The bulk of its appreciation came from a significant strengthening vis-à-vis the Japanese yen and the US dollar, as well as, albeit to a lesser extent, vis-à-vis the pound sterling.

In December 2008 the euro weakened against the Japanese yen and the US dollar (see Chart 1.20). In the latter case, this resulted from a shortage of US currency in global financial markets. The exceptional demand was satisfied primarily through the FX swap market, large-scale financial deleveraging and the cross-border sale of outstanding positions in equities and corporate bonds. The US dollar also benefited from its international status at a time of heightened risk aversion, as evidenced by the close relationship between developments in broad equity indices and implied volatilities. The rising perception

**Chart 1.21 EUR/USD implied and realised volatility**

(July 2008 – May 2009; percentage)




Sources: Bloomberg and ECB calculations.

of risk was also behind the appreciation of the yen, as carry-trade positions were quickly liquidated on account of the remarkable fall in their profitability (see Chart 1.21). Beyond the increasing risk, the lower profitably of carry trades also related to quickly narrowing interest rate differentials between main currency pairs.

The temporary factors that supported the US dollar towards the end of 2008 faded in early 2009, thanks in part to the ample liquidity provided by monetary authorities. As a result, in January 2009 the euro returned to the levels prevailing at the beginning of November 2008. Since then, the euro has generally appreciated, despite some oscillations, albeit of smaller amplitude than those recorded in the last quarter of 2008, which caused it to again strengthen significantly vis-à-vis the US dollar and, still more significantly, against the Japanese yen. The appreciation of the euro was initially related to announcements made by the Federal Open Market Committee (FOMC) regarding additional quantitative easing actions. More recently, it has been favoured by the decline in overall perceptions of risk, as well as some signs of improvement in economic indicators in the United States and the euro area, developments which reportedly enticed investors away from safe-haven currencies.

Tensions in the foreign exchange market have been visible among European currencies. Swings have been noticeable in the case of the EUR/GBP rate, as the United Kingdom has been shaken considerably by the weakness of its economy and banking sector. The currencies of some central and eastern European countries also recorded sizeable oscillations vis-à-vis the euro, as investments in these countries halted in the wake of the deterioration in their expected profitability.

Relative to the peaks recorded by implied and realised volatilities in December 2008 and early January 2009, a perceptible normalisation of conditions has taken place in the foreign exchange market. Nonetheless, volatilities remained somewhat above long-term averages, suggesting that market participants have not yet fully scaled down their expectations that fluctuations in the main bilateral exchange rates are likely to continue.

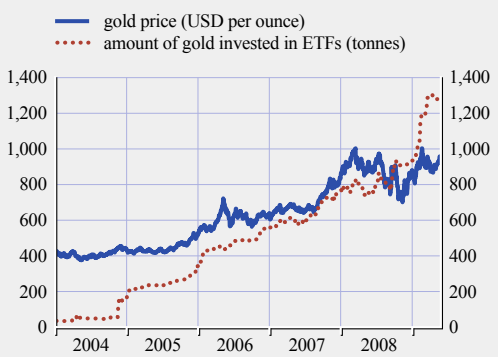
## COMMODITY MARKETS

Commodity prices remained volatile after the finalisation of the last FSR. At the time of writing, most commodity prices had not yet recovered from the broad-based sell-off that took place in September and October 2008 and have since fluctuated within a wide non-directional range. This bearish sentiment reflected concerns about the rapidly deteriorating global economy. Around mid-March, however, improved market sentiment resulted in gradual increases in commodity prices.

Over the past six months, however, there was a sharp recovery in the prices of precious metals. The surge in the price of gold was mainly driven by strengthening investment demand, which was manifested through inflows into gold exchange-traded funds (ETFs) or through purchases of bars and coins (see Chart 1.22). Gold was favoured by investors as a hedge against macroeconomic risks and geopolitical uncertainty. The appeal of gold may also have benefited from concerns about the potential impact of financial rescue and economic stimulus plans on sovereign debt. Alongside

**Chart 1.22 Price of gold and gold holdings of exchange-traded funds (ETFs)**

(Jan. 2004 – May 2009)




Sources: Bloomberg and Exchange Traded Gold.

strong long-term investment interest, speculative interest in gold also increased, as reflected in a rise of speculative net-long positions on futures markets. Volatility remained high, with the gold price becoming more sensitive to changes in investor sentiment.

Notwithstanding some short-lived price corrections in March and April 2009, which coincided with the general increase in risk appetite, thereby reducing the appeal of gold, sustained concerns about the global economy and the condition of financial systems may continue to support the safe-haven status of gold in 2009.

Looking ahead, the outlook for commodities remains closely related to uncertainty surrounding the depth and duration of the economic downturn, and commodity price volatility is likely to remain high. Over the longer-term, the significant cuts in investments made in the mining and metals industry could trigger further sharp rises in commodity prices and heightened volatility.

## 1.3 CONDITIONS OF GLOBAL FINANCIAL INSTITUTIONS

### GLOBAL LARGE AND COMPLEX BANKING GROUPS [6]

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

Global large and complex banking groups (LCBGs) faced challenging conditions in the last quarter of 2008, although there were some tentative signs of improvement in early 2009. Continued asset write-downs and credit losses arose mainly as a result of the ongoing disruption in financial markets, the further declines in the values of structured credit products and the sharper and broader than expected economic downturn. During this period, the sector benefited from extensive capital injections and other government support measures. Banks also continued their efforts to deleverage their balance sheets and to cut costs.

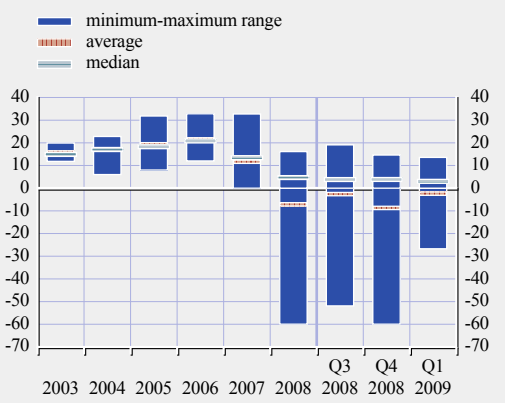
Write-downs by US LCBGs reached USD 332 billion by end-May 2009, while USD 319 billion in fresh capital had been raised by these institutions by that time. In the fourth quarter of 2008 alone, US LCBGs' net income was reduced by USD 42 billion as a result of valuation changes in structured products and new loan impairment charges. As the global economic downturn has strengthened, concerns have increasingly turned to the likelihood of increasing loan losses affecting the financial sector.

The profitability of global LCBGs, as measured by the return on equity (ROE), fell to close to -10% in the final quarter of 2008, but recovered significantly in the first quarter of 2009, to -2.4% (see Chart 1.23). Reflecting the fact that the performance of some of these institutions was very weak, the median (which corrects for outliers) was positive in both quarters, although it fell somewhat in the first quarter of 2009.

6 For a discussion on how global LCBGs are identified, see Box 10 in ECB, *Financial Stability Review*, December 2007. The institutions included in the analysis 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 at the time of finalisation of this issue of the FSR.

**Chart 1.23 Return on equity for global large and complex banking groups**

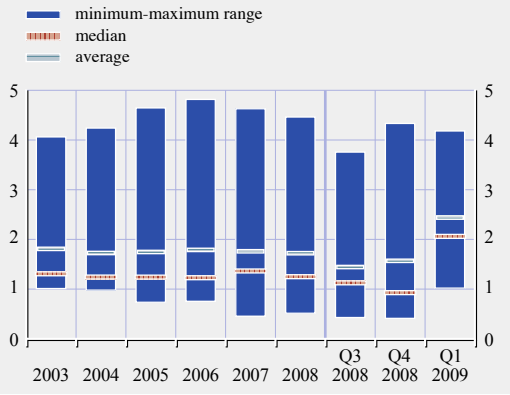
(2003 – Q1 2009; percentage)




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

**Chart 1.24 Fee and commission revenues of global large and complex banking groups**

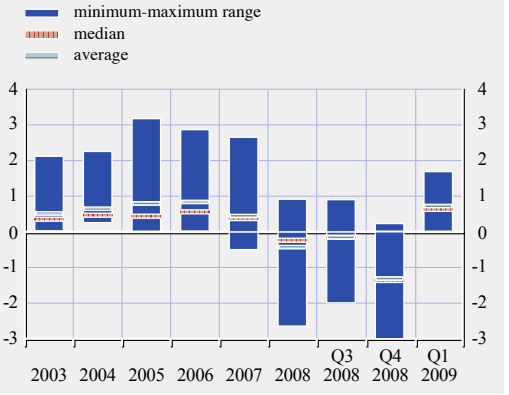
(2003 – Q1 2009; percentage of total assets)




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

**Chart 1.25 Trading revenues of global large and complex banking groups**

(2003 – Q1 2009; percentage of total assets)




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

Behind the improvement in the average ROE was a strengthening of fee, commission and trading revenues in early 2009. As is evident from Chart 1.23, the improvement in the first quarter of 2009 was broad-based, which was reflected in a narrowing of the minimum-maximum range. These tentative signs of improvement for some global LCBGs were generally mirrored in the results for euro area LCBGs (see Section 4.1).

After-tax net incomes improved for many global LCBGs in the first quarter of 2009, although results were somewhat mixed. Several banks posted moderate incomes, and of those banks which had reported by the time of finalisation of this issue of the FSR, just two reported losses. Reductions in net income due to valuation changes on impaired assets were substantial in the last quarter of 2008, although it is difficult to infer whether this related to wider financial market conditions and further write-downs or to a lack of transparency in earlier reporting. In the first quarter of 2009, however, changes to accounting regulations and debt valuation adjustments resulted in net incomes generally being overstated. Allowing for these changes, however, did not change the overall positive nature of the results. The generally positive assessment of the banks participating in the Supervisory Capital Assessment Program (SCAP) suggests that the sector is relatively well placed to weather further turmoil. There were, however, questions about the severity of the adverse scenario employed in the SCAP process and whether the improvements seen in the first quarter could be sustained.

Global LCBGs reported higher fee and commission revenues in the first quarter, owing to increased capital market activities. This resulted from an increase in bond market issuance – related to the low interest rate environment – but it remains to be seen whether improved performances can be sustained beyond the first quarter. Fee and commission revenues as a percentage of total assets improved considerably in 2009, following some signs of improvement in the last quarter of 2008 (see Chart 1.24).

In very stressed market conditions, the median trading revenues of global LCBGSs in the fourth quarter of 2008 dropped significantly to -1.4% (see Chart 1.25).[7] However, they rebounded in the first quarter of the year, to 0.63%.

7 Banks were able to reclassify assets on their balance sheets from trading and available-for-sale to hold-to-maturity in the third and fourth quarters of 2008, thereby offsetting the negative impact of marking-to-market write-downs on their profit and loss accounts. That fourth-quarter trading revenues were considerably worse for most global LCBGs may have related to the reclassification of assets for sale earlier in the year or it may have resulted from banks attempting to smooth losses over the year.

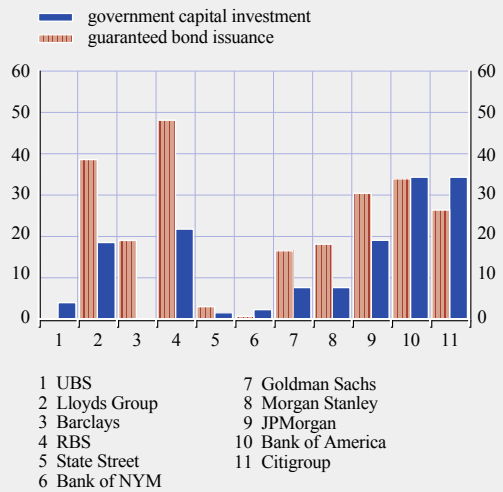
### Solvency positions of global large and complex banking groups

The Tier 1 capital ratios of global LCBGs benefited from substantial government support measures from late 2008 onwards. A downside of this support, however, was that some erosion took place in the quality of bank capital, which left the sector vulnerable to further shocks. In an effort to bolster Tier 1 capital positions, albeit to the detriment of Tier 2 positions, some banks began buying back their own subordinated debt at steep discounts. The gains from these trades were booked as core equity and, in the cases where the banks posted a loss for 2008, these gains were tax deductible. The process of deleveraging also continued to some extent, as many banks made further efforts to de-risk their balance sheets.

Building on the range of initiatives that had been announced by the time the December 2008 FSR was finalised, a battery of government support schemes were extended or announced, particularly in the United States, to bolster the position of global LCBGs. Chart 1.26 illustrates the level of support extended to global LCBGs in the form of capital injections and guarantees on bond issuance.

**Chart 1.26 Government capital investment and guaranteed bond issuance for global large and complex banking groups**

(May 2009; EUR billions)




Source: Bloomberg.

In the United States, the Primary Dealer Credit Facility, the Asset-backed Commercial Paper Money Market Mutual Fund Liquidity Facility and the Term Securities Lending Facility were all extended in December and again in February, until October 2009. The Term Asset-backed Securities Loan Facility (TALF) was also expanded. In an effort to lower mortgage rates, the Federal Reserve System also announced plans to purchase up to USD 500 billion in mortgage-backed securities.

In February 2009, the US Financial Stability Plan was announced and further details were released in March. The multifaceted joint initiative of the Federal Reserve System, the Treasury and the Federal Deposit Insurance Corporation (FDIC) included plans for further capital assistance. This was primarily targeted towards those 19 banks with total assets in excess of USD 100 billion, based on the outcome of stress testing and an asset removal scheme, the Public-Private Investment Program (PPIP). The latter is a plan for private investors to work in tandem with the authorities in removing impaired assets from banks' balance sheets, consisting of elements to deal with impaired loans and assets. The plan was initially criticised for its lack of detail, although more recent announcements have addressed some of these concerns. Questions have also been raised about the assumptions underlying the stress testing exercises and the mechanism by which assets will be priced by private investors. Furthermore, in March, a relaxation of marking-to-market accounting regulations was announced, which may allow banks to revalue assets on their books if they were deemed to be previously priced in distressed transactions. While this is a positive step in terms of averting further write-downs, the move to some extent counteracts the aims of the PPIP: the impaired, albeit re-priced, assets remain on banks' balance sheets.

The SCAP stress tests found that nine of the 19 participating banks were deemed to have sufficient capital buffers to withstand the adverse scenario employed in the exercise. For the ten remaining banks, additional capital requirements were estimated at USD 185 billion at end-2008, although capital raising actions and the effects of better than expected financial results for the first quarter of 2009 caused the actual amount of capital required by May, when the results where announced, to be significantly lower, namely USD 74.6 billion. The findings of the SCAP were largely seen to be positive, and financial markets reacted accordingly.

In the United Kingdom, along with guarantees and recapitalisations, an asset insurance scheme was implemented with the joint aims of reinforcing the stability of the financial system and increasing the capacity of banks to provide credit to the economy. In addition to a fee for participation, banks were also required to commit to binding agreements to increase lending.

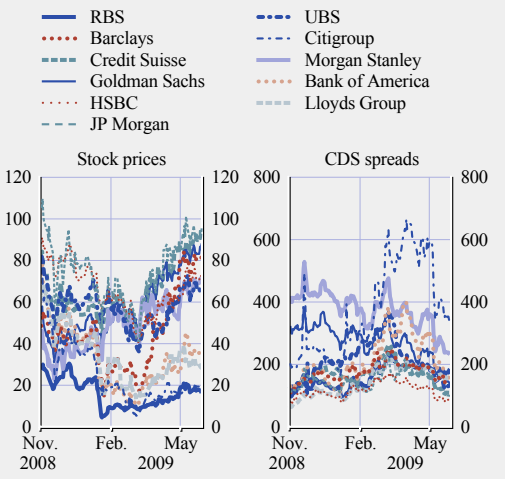
### Outlook for global large and complex banking groups on the basis of market indicators

Notwithstanding the poor performance of global LCBGs in the last quarter of 2008, government support measures were instrumental in ensuring some degree of stability in the sector and preventing further credit events. Equally, while the improved performance in early 2009 cannot be directly attributed to these measures, the stability that resulted from their implementation has been instrumental. As concerns grew for the global economy, however, the outlook for LCBGs darkened once again.

Despite the breadth and depth of the measures taken, the share prices of global LCBGs generally continued to fall in early 2009, although developments were somewhat disparate (see Charts 1.27 and S12). The detailed announcement of the US Financial Stability Plan in March, along with the improvement of banks' earnings in the first quarter of 2009, boosted stock prices in mid-March. Broad bank stock price indices remained at those levels until early April, when share prices were depressed further, amid

**Chart 1.27 Stock prices and CDS spreads of a sample of global large and complex banking groups**

(Nov. 2008 – May 2009; stock price index: Sep. 2008 = 100; spreads in basis points; senior debt, five-year maturity)




Source: Bloomberg.

fears that the amount of impaired assets may be greater than previously considered. These concerns were compounded by the expression of interest by global LCBGs in purchasing impaired assets through the PPIP, raising fears that the programme would fail to rid the sector entirely of the assets.

The upward trend in share prices resumed, however, and continued through to the end of May, as optimism about the durability of first-quarter performances prevailed. The stress test results initially provided further impetus in this regard, but the effect was short-lived. Credit default swap (CDS) spreads also continued to rise after the end of 2008, although there was some volatility. By January 2009, default probability and distance-to-default measures reached levels not seen in over a decade and the trajectory of these measures indicated no improvement in the outlook (see Charts S10 and S11). Since the collapse of Lehman Brothers, spreads of global LCBGs narrowed somewhat (see Chart 1.27 and S13). Those banks receiving the most significant government support, and therefore perhaps seen as possible candidates for nationalisation, saw the largest increases in spreads over this period. This suggests that the information content of

these spreads may now be somewhat diluted and relate more to expectations regarding potential further government intervention and actions, rather than to the likelihood of future credit events, insofar as these can be separated. Most recently, however, CDS spreads have tightened, significantly in some cases, reflecting the positive assessment of the SCAP results.

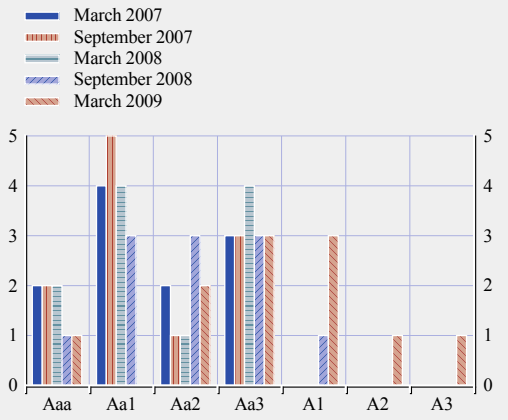
The ongoing challenges encountered by global LCBGs have resulted in a series of rating downgrades (see Chart 1.28). Since March 2007, the ratings for global LCBGs have shifted down the ratings scale, with those institutions receiving most government support being severely affected. Bank of America and Citigroup saw their Moody's ratings drop by four and five notches respectively between March 2007 and March 2009. Such downgrades also had an impact on banks' structured credit products, precipitated further write-downs and increased capital risk-weightings, at a time when the weightings on performing assets were also pushed upwards as a result of the deterioration in the global economic outlook. These effects had further negative repercussions on banks' capital positions and to some extent undermined the effectiveness of the liability-side measures implemented by national authorities in 2008 and early 2009. This, along with increasing recognition of the size of the impaired assets problem, placed the focus on the asset side of banks' balance sheets and on schemes to remove impaired assets.

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

Estimates of potential loan losses have continued to increase as the macroeconomic climate has deteriorated. Losses are expected to affect households, not just in terms of their borrowing to fund real estate investment, but also for credit cards and auto loans, as rising unemployment levels impact on debt-servicing ability. Commercial property has also been regarded as a likely source of further losses, and corporate default rates are forecast to reach exceptionally high levels. Total net loan write-offs for large US banks have increased since late 2007, and are now above the levels seen during the recession of 2001-02 (see Chart 1.29). More worryingly, however, non-performing loan rates have increased sharply, reaching levels not seen since the Savings and Loan crisis. A large gap has opened up between write-off rates and non-performing loan rates, which suggests that write-offs could

**Chart 1.28 Ratings migration of a sample of global large and complex banking groups**

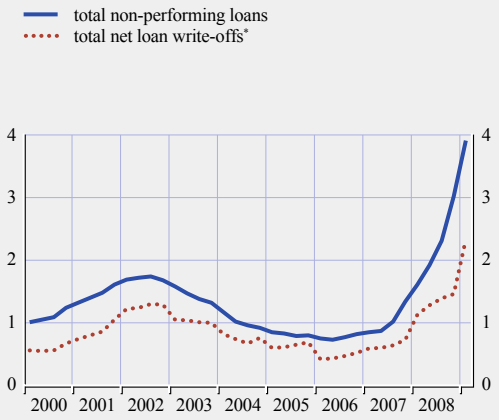
(Mar. 2007 – Mar. 2009; number of institutions)




Source: Moody's.
Note: Based on a sample of long-term issuer ratings for 11 LCBGs.

**Chart 1.29 Non-performing loan and charge-off rates for large US banks**

(Q1 2000 – Q1 2009; percentage of total)




Sources: Federal Financial Institutions Examination Council and the Federal Reserve System.
Note: Data relate to banks with total assets in excess of USD 20 billion. Data are annualised.
* Referred to as "charge-offs" by the Federal Reserve System.

increase even further in the near term. Given the losses already sustained by global LCBGs and the fact that many have yet to cleanse their balance sheets of impaired asset portfolios, the possibility of significant loan losses represents a dark outlook for the sector and will increase the need for sufficient loan-loss provisions to be made. At a time when retained earnings are potentially important for institutions to rebuild their capital bases, increasing loan-loss provisions may quickly consume available resources.

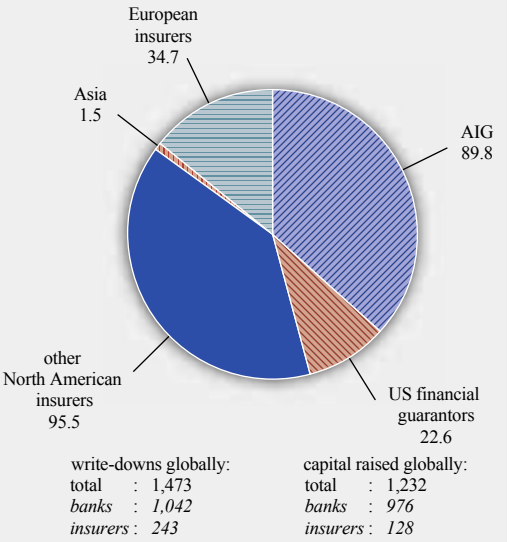
The outlook for global LCBGs in the near to medium term depends primarily on two key factors: first, the ability of the banks themselves, perhaps with the benefit of government support measures, to return to profitability and to overcome the difficulties associated with impaired asset portfolios; and, second, the depth and duration of the global economic downturn, and in particular that in the United States. The US Financial Stability Plan and the measures enacted elsewhere certainly have the potential to relieve global LCBGs, allowing them to recover, although questions remain as to the efficacy of some of the plans. The global macroeconomic outlook is surrounded by a very high degree of uncertainty (see Section 1.1), and continued stresses in this regard may lead to further loan losses, particularly from the corporate and household sectors. Given that the shock-absorption capacity of the financial system has already been severely tested, global LCBGs remain vulnerable to further credit events and any deterioration in the wider economy.

## MAJOR GLOBAL INSURERS

Global insurers have reported increased write-downs since the finalisation of the December 2008 FSR. Of the USD 1.48 trillion in write-downs reported globally by financial institutions, insurers accounted for USD 243 billion, or 16% of the total amount. The write-downs reported by insurers were dominated by the US insurer AIG, US "monoline" financial guarantors and other North American insurers (see Chart 1.30). Whereas banks throughout the world have raised almost the same amount of capital as their reported write-downs, insurers across the globe have raised about USD 128 billion, i.e. for around half the amount of their reported write-downs.

**Chart 1.30 Write-downs by insurers globally since July 2007**

(as at 28 May 2009; USD billions)




Sources: Bloomberg and ECB calculations.
Note: The data do not cover all insurers globally. The data are not fully comparable across countries and regions due to differences in accounting practises.

The problems and risks confronting AIG and the financial guarantors in particular, which were highlighted in previous issues of the FSR, have continued to materialise over the past six months. AIG reported a fourth-quarter loss of USD 62 billion – the largest loss ever recorded by a corporation – and subsequently received a further USD 30 billion in government capital, bringing the total federal support for this institution to USD 182.5 billion. The loss reported for the first quarter of 2009 was significantly lower at USD 4.35 billion.

Most of the financial guarantors also continued to report large losses in recent quarters, following the persistence of problems in the credit markets. Together with the limited underwriting of new structured credit product insurance and guarantors' reduced capital buffers, this resulted in several of them having

their ratings downgraded in the past six months. Some fell deep into the speculative-grade range and most of them currently have a negative outlook for their ratings. The rating downgrades of guarantors also led to rating downgrades of the securities they insure, which, in turn, caused further marking-to-market losses for institutions, often banks that had bought credit protection from them (see also Sections 1.3 and 4).

The outlook for global insurers remains uncertain as financial conditions have worsened and risks remain. In the period ahead, conditions in financial markets and the economic environment will be key. Further losses and the need to bolster capital positions are likely if macro-financial conditions remain challenging for insurers. Should this occur, it will continue to affect, in particular, the functioning of structured credit markets (see Section 3.2) and the condition of other financial institutions that have exposures to insurers (see Section 4).

## HEDGE FUNDS

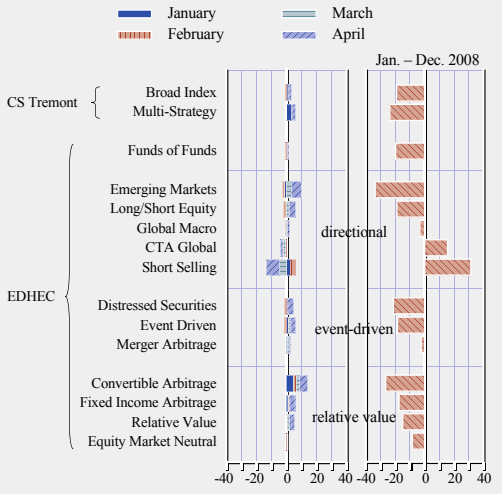
After a very poor overall investment performance in 2008, average hedge fund returns were meagre in the first three months of 2009 but, amid asset-price rallies across a broad range of financial markets, they improved markedly in April 2009 (see Chart 1.31).

### Redemptions

Investors' redemptions reached record levels in the last quarter of 2008 (see Chart S15 and Chart 1.32) and bleak investment returns in the first quarter of 2009 were certainly not supportive in halting them. Poor return performances and record redemptions have led to estimates that the amount of investors' capital managed by single-manager hedge funds might decrease to close to USD 1 trillion by mid-2009. This would represent a halving of the size of the sector compared with the peak of nearly USD 2 trillion reached in mid-2008.[8] The pace of withdrawals, however, seemed to be slowing down in the first quarter of 2009.

**Chart 1.31 Global hedge fund returns**

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




Sources: Bloomberg and EDHEC Risk and Asset Management Research Centre.
Note: EDHEC indices represent the first component of a principal component analysis of similar indices from major hedge fund return index families.

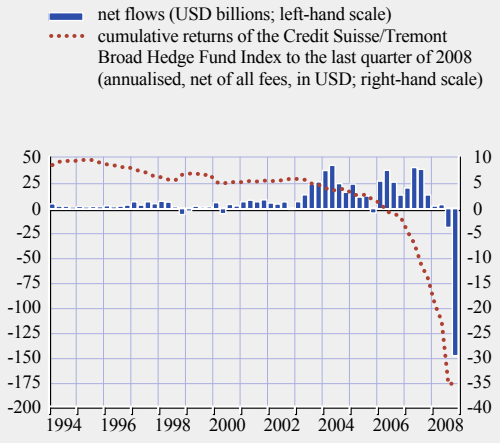
Nonetheless, it is noteworthy that default time-weighted returns do not take into account the timing of investors' flows and, in relation to money-weighted returns, may underestimate looming redemption risk stemming from investors who invested at the wrong point in time. For instance, investors who entered the hedge fund sector after the first quarter of 2006 and were still holding their investments by the end of the final quarter of 2008 were all, on average, showing losses on their investments (see Chart 1.32). As a result, the likelihood that these investors could withdraw their funds might be higher compared with investors who put their money into hedge funds before 2006.[9]

8 Some investors, particularly larger ones, have reportedly been increasingly insisting on customised separate (managed) accounts, run in parallel with fund structures managed by the same investment managers, and this may have also contributed to the reduction of the estimated total size of the hedge fund sector.

9 Based on Chart 1.32, investors' net outflows during the second half of 2008 fully offset the cumulative net inflows dating back to the third quarter of 2006.

**Chart 1.32 Global hedge fund net flows and cumulative returns by investment period**

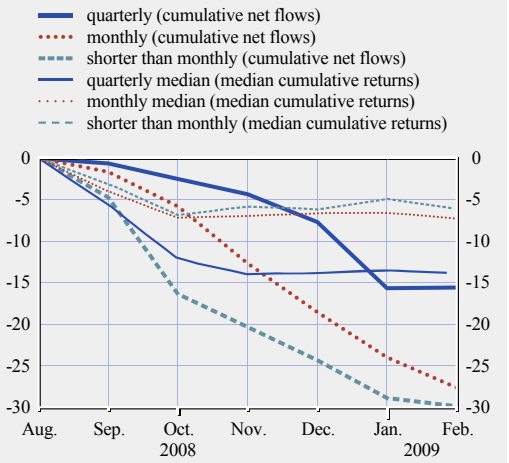
(Q1 1994 – Q4 2008)




Sources: Lipper TASS, Bloomberg and ECB calculations.

**Chart 1.33 Cumulative net flows and median cumulative returns of single-manager hedge funds by redemption frequency**

(Aug. 2008 – Feb. 2009; index: Aug. 2008 = 100; cumulative net flows as a percentage of the capital under management of the respective hedge fund group at the end of August 2008 and median cumulative returns, net of all fees in fund's reporting currency)




Sources: Lipper TASS database and ECB calculations.
Notes: Excluding funds of hedge funds. The sample consisted of 1,759 hedge fund investment records with complete information on both investment returns and capital under management from August 2008 to February 2009.

According to market intelligence, funds of hedge funds (FOHFs) often submitted the largest redemption requests. This is because they were often confronted with liquidity mismatches between redemption terms offered to their investors and the liquidity of underlying investments in single-manager hedge funds. Furthermore, those FOHFs that had investments linked to the Madoff fraud were hit especially hard. Some institutional investors also reportedly sought funds from single-manager hedge funds or FOHFs in order to honour their investment commitments to private equity funds or to rebalance their alternative investment allocations.

On account of large redemption requests and difficulties in selling assets in rather illiquid markets, and in order to protect remaining investors from being left with less liquid assets, some hedge funds opted to restrict client withdrawals by activating gate provisions[10] or suspending redemptions altogether. In some cases, this reportedly encouraged some investors to submit redemption requests that were larger than their true liquidity needs, in order to avoid being "gated". The amount of pent-up redemptions might be non-negligible and would partly explain why net outflows were widely expected to continue in the second quarter of 2009.

According to some market participants, redemptions sometimes seemed to be rather indiscriminate, since even well-performing hedge funds received substantial redemption requests, suggesting that investors, particularly FOHFs, attempted to withdraw their money from wherever they could. Indeed, after August 2008, hedge funds with the shortest redemption frequencies experienced the fastest net outflows (see Chart 1.33), despite the fact that their median cumulative returns were markedly better than those of funds with less frequent redemption possibilities. While

10 Gate provisions limit withdrawals per redemption period as a proportion of the capital under management.

this analysis does not take into account other factors that might explain the apparent disparity between net outflows and investment returns (e.g. investment strategy effects), it nevertheless provides some support for the claims made by market participants.

### Exposures and leverage

Since the finalisation of the December 2008 FSR, the average level of leverage in the hedge fund sector appears to have remained low and, therefore, has not exacerbated the negative effects of funding liquidity pressures associated with large investor redemptions. There were, however, some signs that leverage levels may have bottomed out (see Chart 1.34), possibly on account of strong demand for high-grade debt securities and expectations of a recovery of equity markets.

The reduced availability of leverage raised questions regarding the viability of leverage-dependent investment strategies. However, despite the significant tightening of margin terms since the start of the turmoil, the haircuts set by banks for good investments (e.g. in investment-grade corporate bonds) were still rather reasonable, i.e. leverage was still available – only prime broker banks became very selective with respect to the securities they accepted as collateral.

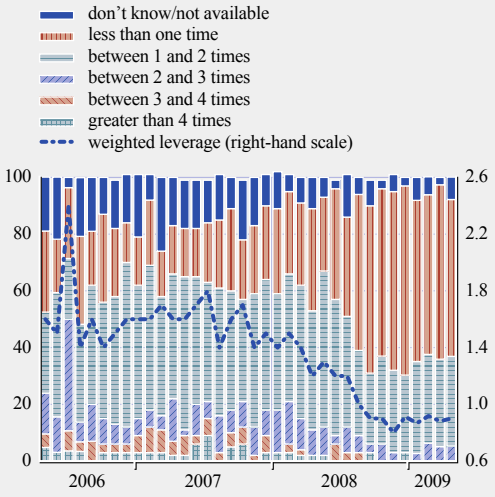
At the beginning of 2009, owing to low levels of leverage and decreasing funding liquidity pressures, there were fewer occurrences of correlated distressed sales. This was reflected in a decline of moving median pair-wise correlation coefficients of the returns of hedge funds within some of the more popular investment strategies (see Chart 1.35). These correlations can provide a gauge of the similarity of hedge fund investment exposures and the associated risk of an abrupt collective exit from such crowded trades.

### Liquidations

After very unsuccessful investment performances in 2008 and weak returns in 2009, many single-manager hedge funds and their

**Chart 1.34 Hedge fund leverage**

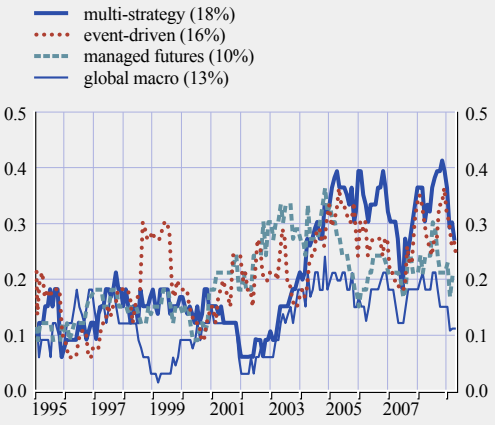
(May 2006 – Apr. 2009; percentage of responses and weighted average leverage)




Source: Merrill Lynch, *Global Fund Manager Survey*.
Notes: Leverage is defined as a ratio of gross assets to capital. Bars do not add up to 100 due to rounding. In 2008 and 2009, the number of responses varied from 32 to 45.

**Chart 1.35 Medians of pair-wise correlation coefficients of monthly global hedge fund returns within strategies**

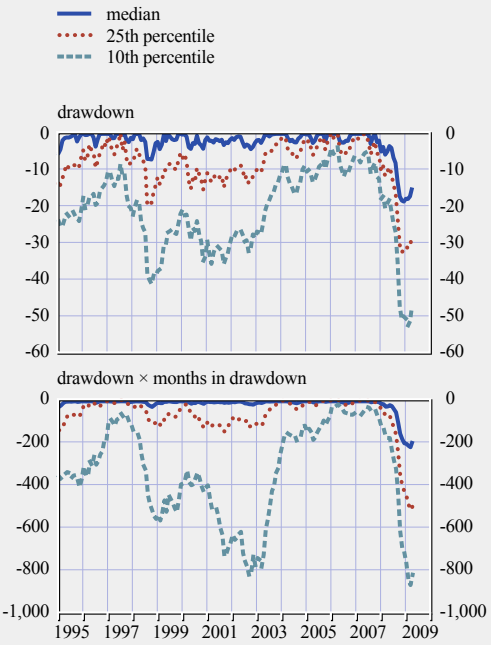
(Jan. 2005 – Apr. 2009; Kendall's $\tau_b$ correlation coefficient; monthly returns, net of all fees, in USD; moving 12-month window)




Sources: Lipper TASS database, Lipper TASS and ECB calculations.
Notes: Numbers in brackets after strategy names indicate the share of total capital under management (excluding funds of hedge funds) at the end of December 2008, as reported by Lipper TASS. If, instead of one fund or sub-fund, several sub-fund structures were listed in the database, their weighted average monthly return in US dollars was used. Sub-fund structures typically represent onshore and offshore versions or different classes of shares (usually differing in currency denomination) that basically correspond to the same pool of money managed in a highly correlated or nearly identical way.

**Chart 1.36 Distribution of single-manager hedge fund drawdowns globally**

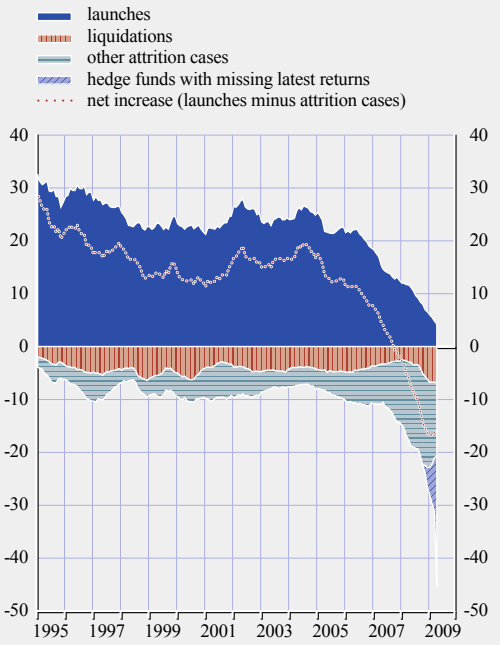
(Jan. 1995 – Apr. 2009; percentage of monthly returns, net of all fees, in fund's reporting currency)




Sources: Lipper TASS database and ECB calculations.
Note: The drawdown indicator refers to the cumulative percentage decline from the latest historical performance peak of a hedge fund as measured by net asset value per participation unit.

**Chart 1.37 Global hedge fund launch, liquidation and attrition rates**

(Jan. 1995 – Apr. 2009; 12-month moving sum and the number of funds with missing latest returns as a percentage of funds existing 12 months earlier)




Sources: Lipper TASS database and ECB calculations.
Notes: Excluding funds of hedge funds. If, instead of one fund or sub-fund, several sub-fund structures were listed in the database, each of them was analysed independently. In the database, cases of attrition are classified as follows: liquidated, no longer reporting, unable to contact, closed to new investment, merged into another entity, fund dormant, program closed, unknown. Cases of liquidation or other attrition are assumed to have taken place during the month following last reported returns. They were identified based on the attrition code only. Therefore, attrition data, particularly the most recent information, should be interpreted with caution. In addition, the most recent data are subject to incomplete reporting.

management firms were on the verge of liquidation since their cumulative investment results remained substantially below their high watermarks[11] (see Chart 1.36), which made the prospect of receiving performance fees rather remote. Since performance fees are typically very important for hedge fund management firms, many smaller firms may be forced to discontinue their operations and liquidate managed hedge funds (see Chart 1.37).

All in all, the average level of leverage in the hedge fund sector seems to have bottomed out. It could start increasing as soon as financial markets recover. In the period ahead, the main hedge fund-related risks for financial markets stem from the possibility of a continuation of forced investment portfolio unwindings as a result of further investor redemptions and fund closures on account of the insufficient size of remaining capital under management.

11 High watermark provision stipulates that performance fees are paid only if cumulative performance recovers any past shortfalls.

## 2 THE EURO AREA ENVIRONMENT

*Risks to the stability of the euro area financial system have increased further over the past six months on account of a decline in global and domestic demand, which is leading to a deterioration in the condition of corporates' and households' balance sheets. The level of indebtedness of the euro area corporate sector remains relatively high, while earnings prospects have deteriorated considerably. This is likely to create challenges for some firms in servicing or refinancing debt. At the same time, conditions in euro area labour markets have also deteriorated, with unemployment rising in a number of countries. This has added to the risks related to residential property markets, while conditions have also deteriorated further in commercial property markets. This difficult operating environment points to a possible further rise in potential credit losses for banks stemming from exposures to vulnerable non-financial sector borrowers, reinforcing the negative interplay between the financial sector and the real economy.*

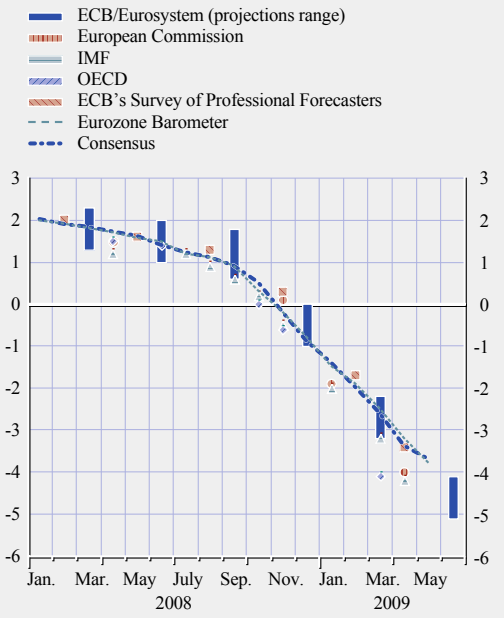
### 2.1 ECONOMIC OUTLOOK AND RISKS

Reflecting primarily the further intensification and broadening of the global financial market turmoil, the pace of economic activity in the euro area slowed significantly after the finalisation of the December 2008 Financial Stability Review (FSR). While the contraction was initially most pronounced in industrial activity, for the first time since 1995 (as of when national accounts data for the euro area are available), services activity also declined on a quarter-on-quarter basis in the last quarter of 2008. Following this, a significant contraction of euro area economic activity took place in the first quarter of 2009, characterised by a broad-based decline in both domestic demand and euro area trade volumes.

The outlook for the economy continues to be surrounded by a high degree of uncertainty. Following a weak start in 2009, there have recently been increasing signs from survey data – both within and outside the euro area – suggesting that the pace of deterioration in activity is moderating and that consumer and business sentiment is improving, although still remaining at low levels. Looking forward, both external and domestic demand are expected to decline further in 2009 and to gradually recover in 2010. This assessment is also reflected in the June 2009 Eurosystem staff macroeconomic projections for the euro area, which place annual real GDP growth in a range of between -5.1% and -4.1% in 2009, and between -1.0% and 0.4% in 2010.[1] More generally, private sector forecasters and international institutions have progressively been revising their estimates of real GDP growth for 2009, and the rest of the period from 2008 to 2010, sharply downwards (see Chart 2.1).

**Chart 2.1 Evolution of euro area real GDP growth forecasts for 2009**

(Jan. 2008 – June 2009; percentage change per annum)




Sources: ECB, European Commission, IMF, OECD, Eurozone Barometer and Consensus Economics.
Notes: The dates on the x-axis correspond to the release dates of the various estimates (published or preliminary confidential). The time span between the cut-off date for information used and the actual publication date varies across projections.

1 The June 2009 Eurosystem staff macroeconomic projections were published on 4 June 2009, after the cut-off date for this issue of the FSR.

Overall, the risks to the economic outlook are broadly balanced. On the one hand, there may be stronger than anticipated effects stemming from the extensive macroeconomic stimulus under way and from other policy measures taken. Confidence may also improve more quickly than currently expected. On the other hand, there are concerns that the turmoil in the financial markets may have a stronger impact on the real economy, as well as concerns regarding more unfavourable developments in labour markets, the intensification of protectionist pressures and, finally, adverse developments in the world economy stemming from a disorderly correction of global inbalances. Amongst the downside risks, a key issue for the assessment of financial stability is the potential for the financial market turmoil to have a stronger impact on the real economy.

To some extent, the risk that the financial sector strains would spill over into the euro area economy has already materialised since the publication of the December 2008 FSR. This raises the potential for a strengthened negative feedback loop between the financial sector and the real economy. The sluggish outlook for the macroeconomic environment is an important source of vulnerability for the financial system. Slower growth affects the profits and earnings of firms and households, and their ability to honour their financial obligations. In this way, weak economic growth could entail a worsening of the credit quality of banks' loan portfolios. At the same time, any further moderation in demand could trigger further falls in asset prices, thereby prompting an additional tightening of credit conditions, which would further weaken confidence and demand. If balance sheets became further constrained – for instance, by regulatory capital minima in the case of banks, or collateral or other net worth limits in the case of households and businesses – this would add to the downside risks for economic activity. This is because it raises the risk of banks cutting back on their lending, and of firms and households increasing their saving sharply. Such a downward spiral would further increase strains on a financial system whose shock-absorption capacity has already been significantly impaired. To assess the likelihood of such a scenario materialising from a historical perspective, Box 4 looks at the evolution of macro-variables during five previous systemic banking crises, contrasting these patterns with the recent euro area experience and current projections. This comparison, which should be interpreted with some caution in the light of the heterogeneity across previous crises, signals that, while the current situation contrasts to some extent with previous episodes, there are also some similarities.

An additional issue which has received some attention in the public debate is the possibility of deflation in the euro area. While deflation can carry significant financial stability risks, this risk is assessed as being limited. While the annual inflation rate is likely to remain negative for some months in 2009, it is expected that this will only be a temporary phenomenon as it reflects relative price movements (particularly of volatile energy prices). The ongoing disinflation in the euro area must be distinguished from a deflationary process, given that the decline in the price levels is neither generalised (affecting a broad set of prices), nor persistent (lasting for an extended period of time), nor self-reinforcing (entrenched in the expectations of economic agents). Indeed, all available indicators of inflation expectations over the medium to longer term remain firmly anchored at levels consistent with price stability.

All in all, the further worsening of the macro-financial environment in the euro area since the finalisation of the previous FSR has translated into a significant increase in the risks to financial stability. In particular, it has imposed further pressures on financial institutions' assets via a deterioration of their household and corporate credit portfolios. That said, there are signs that the trough of the current downturn may have been reached, thereby mitigating the complete materialisation, for the time being, of an adverse feedback loop between the financial sector and the real economy.

Box 4

## THE CURRENT MACROECONOMIC CYCLE: A COMPARISON WITH PREVIOUS BANKING CRISES

As the global financial crisis intensified and spread over the past year, the macroeconomic outlook in the euro area worsened significantly. One way of better understanding the possible impact of the financial turmoil on the real economy is to compare the amplitude and time profile of macroeconomic cycles (and patterns in macro-variables) with those observed during past episodes of banking crises.[1] With the inevitable caveats – including that no two financial crises or recessions are entirely alike – a comparison with earlier episodes provides some insight into the "common" or "average" path followed by economies facing significant financial dislocation.[2]

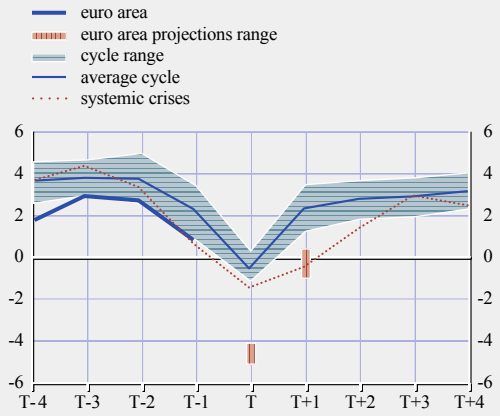
Charts A to D illustrate the evolution of certain macro-variables in various advanced economies during five systemic banking crises, namely Spain (1977), Norway (1987), Finland (1991), Sweden (1991) and Japan (1992). They also compare them with the average experience during other "normal" cycles (i.e. those downturns that occurred without financial turmoil) in 20 advanced economies. Clear differences in the depth and duration of the downturn can

1 For other studies on the evolution of macroeconomic indicators in countries experiencing banking crises, see C. Reinhart and K. Rogoff, "The aftermath of financial crises", *NBER Working Paper*, No w14656, National Bureau of Economic Reasearch, January 2009; and S. Claessens, M. A. Kose and M. E. Terrones, "What happens during recessions, crunches and busts?", *IMF Working Paper*, No 08/274, December 2008. For a discussion of leading macrofinancial indicators of financial turmoil, see Box 5 in ECB, *Financial Stability Review*, June 2008.

2 The caveats are not trivial. The comparisons average across countries, time and policy regime; the initial causes of the crises and policy responses differed. The same is true for other cycles.

**Chart A Real GDP growth during banking crises and "normal" cycles**

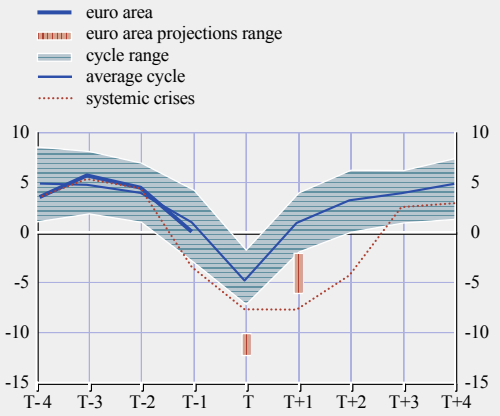
(percentage change per annum)




Sources: Eurostat, ECB, AMECO, IMF, European Commission and ECB calculations.
Notes: The "systemic crises" line shows the average profile of macro-variables during five systemic banking crises in advanced economies: Spain in 1977, Norway in 1987, Finland in 1991, Sweden in 1991 and Japan in 1992. In each case, period T represents the trough in GDP growth following the onset of a banking crisis. The "average cycle" line shows the mean path for variables across cycles in 20 advanced economies from the 1970s onwards. The "cycle range" shows the inter-quartile ranges of those cycles. The "euro area" line shows the recent experience in the euro area and the bars show projection ranges embodied in the ECB/Eurosystem staff macroeconomic projections for June 2009, where period T represents 2009.

**Chart B Real investment growth during banking crises and "normal" cycles**

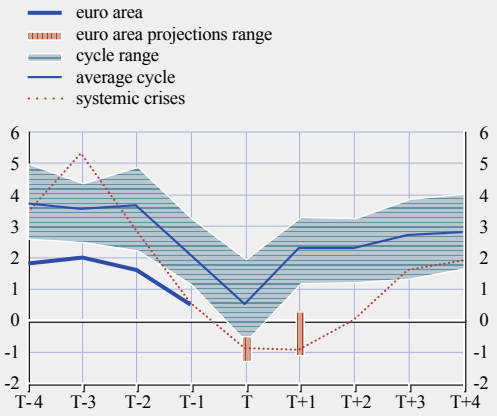
(percentage change per annum)




Sources: Eurostat, ECB, AMECO, IMF, European Commission and ECB calculations.
Notes: See notes to Chart A.

**Chart C Real consumption during banking crises and "normal" cycles**

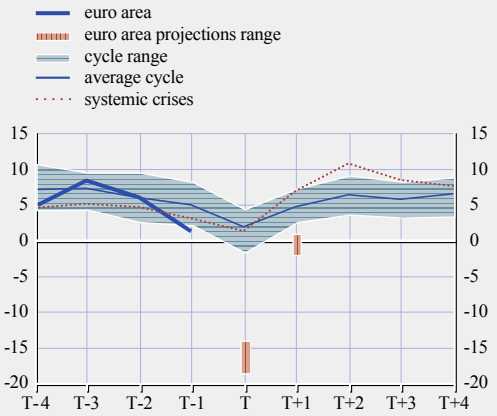
(percentage change per annum)




Sources: Eurostat, ECB, AMECO, IMF, European Commission and ECB calculations.
Notes: See Notes to Chart A.

**Chart D Real exports during banking crises and "normal" cycles**

(percentage change per annum)




Sources: Eurostat, ECB, AMECO, IMF, European Commission and ECB calculations.
Notes: See Notes to Chart A.

be observed: "normal" cycles display a sharp decline in activity growth followed by a swift recovery, which is represented by a pronounced "V" shape, while banking crises involve a more protracted, "U-shaped recession" (see Chart A). These differences are also apparent in the components of demand. Countries experiencing a banking crisis tend to undergo prolonged adjustment in investment (see Chart B), particularly in residential investment (which partly reflects strong declines in residential property prices). Compared with "normal" cycles, household consumption is also weaker (see Chart C). In part, this reflects the decline in household incomes – unemployment, for example, increased sharply during past banking crises. However, the moderation in consumption also reflects an increase in the proportion of income saved, as households possibly increased precautionary savings or attempted to repair their balance sheets. Finally, it appears that the impetus to growth from external demand is a considerably more important driver of recovery for countries coming out of a banking crisis (see Chart D). In some instances, this was driven by marked real exchange rate depreciation, but it was also because, in some cases, financial instability was country-specific: global growth remained relatively resilient and an export-led recovery was more possible.

The comparison with past banking crises provides a certain context for the recent and expected macroeconomic performance of the euro area. Reflecting the ongoing impact of the financial turmoil, projections for the euro area outlook by private sector forecasters and other international institutions have been revised down significantly in recent months.[3] Expectations are generally for a "U"-shaped recession, typical of periods of severe financial instability. The Eurosystem staff macroeconomic projections published in June 2009 also provided a central projection that was similar to the past experiences of economies undergoing significant adjustment in the financial sector.

3 See Chart 2.1.

However, compared with previous recessions, there were differences across the ECB/Eurosystem staff projections for demand components, which highlight some of the different ways in which the financial crisis has affected the euro area. While the projection included a prolonged fall in investment and muted consumption growth, the corresponding path for overall domestic demand was slightly higher than that observed in some of the previous crises. In part, that reflects the strong policy measures taken in response to the financial turmoil, which should eventually help to boost confidence and domestic demand. By contrast, the expected profile for exports was significantly more downbeat than in previous cycles. This reflects the rapid deterioration in the international environment, with a more synchronised slowdown across advanced and emerging economies than observed in the past.

## 2.2 BALANCE SHEET CONDITION OF NON-FINANCIAL CORPORATIONS

The operating environment of euro area firms deteriorated significantly after the publication of the December 2008 FSR, as a result of the extraordinary decline in global demand in the first months of 2009. As a consequence, euro area firms' balance sheets have deteriorated over the past six months.

The December 2008 FSR identified three vulnerabilities of euro area non-financial corporations. These included high indebtedness, deteriorating profitability and fragilities in the cost and availability of financing. Over the past six months, risks related to the first two have intensified further, while some relief for the cost of funding of euro area firms came from the monetary policy easing of the ECB after October 2008. However, the extent to which firms have been able so far to benefit from these interest rate reductions has differed widely.

These vulnerabilities, together with the expected substantial deterioration of euro area and global economic activity throughout 2009, pose considerable challenges for financial stability in the period ahead. Over the past six months, there have been growing signs that a negative feedback loop between the euro area real economy and the financial sector has been taking hold. This has brought with it the risk of a vicious circle of tightening financing conditions and a surge in corporate bankruptcies (see Chart S53).

### EXPECTATIONS FOR CORPORATE SECTOR CREDITWORTHINESS

A number of indicators, such as equity prices, corporate bond spreads and credit default swap (CDS) indices, show that the expectations of market participants and market observers deteriorated further in the first weeks of 2009 before they began to recover in March (see Section 3.2). The recovery in markets coincided with some signs of improvement in business surveys, which nevertheless remained at historically low levels, signalling a slowdown in the pace of deterioration of the real economy.

Corporate default rates are unlikely to have reached their peak in this recession. According to Moody's, European speculative grade-rated corporations' default rate is expected to jump to close to 20% by the end of 2009 (see Chart S53 and also Box 5). Furthermore, credit rating agencies revised their ratings of non-financial corporations considerably downwards. Both in the last quarter of 2008 and in the first quarter of 2009, the number of quarterly downward revisions reached twice the level observed in the trough of the last economic downturn, in 2002 (see Chart S54).

Box 5

## CORPORATE DEFAULTS: A LIKELY SOURCE OF FURTHER FINANCIAL SYSTEM STRESS

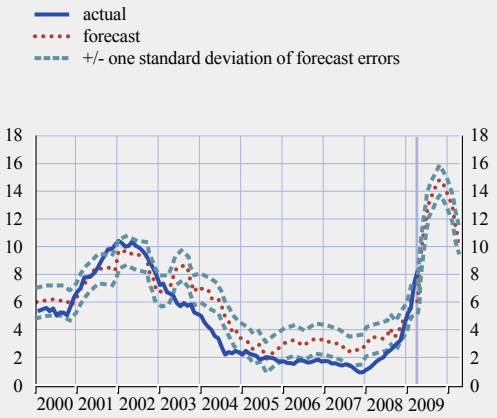
Throughout the ongoing financial turmoil, much emphasis has been placed on the size and significance of write-downs by financial institutions on their asset-backed securities and derivatives holdings. Increasingly, however, attention is focusing on corporate debt and the likely loan losses that may materialise as the turmoil continues and the real economy endures a significant slowdown. This box explores this issue in the context of speculative-grade corporate debt and finds evidence of a sharp increase in losses on corporate bond holdings since the end of 2008. These have arisen from an increase in corporate default rates, combined with a decline in the remaining value of defaulting firms. This may have an impact on the ability and willingness of the financial system to provide further financing to the non-financial sector.

Global speculative-grade corporate default rates had declined to extraordinarily low levels from the peaks of 2002 (see Chart A). While default rates had been expected to increase as from 2005, actual default rates only started picking up in the course of 2008 and intensified during the first months of 2009. Recent default rate patterns in Europe have been very similar. Moody's latest model-based forecasts, however, predict that 12-month trailing-sum default rates in Europe will be close to 20% by late 2009 (see Chart S53), somewhat higher than the global rate (see Chart A); default rates in all regions are expected to moderate in 2010.[1] At the same time, the recovery rates for defaulting global firms declined in 2008 (see Chart B). Given the high level of firms'

1 Data for forecasts of European default rates are only available from 2008. As it is important to be able to make a comparison with the previous downturn, this box focuses on global data. In Europe, Moody's expects the sector of *durable consumer goods* to experience the highest default rate over the next 12 months. This differs from the United States where, among various industries, Moody's expects the *consumer transportation* sector to be the most troubled. Figures should be read with caution since the high level of uncertainty surrounding the potential length and severity of the current global economic downturn implies similarly high uncertainty for model-based forecasts of default rates.

**Chart A Actual and forecast default rates of global speculative-grade corporations**

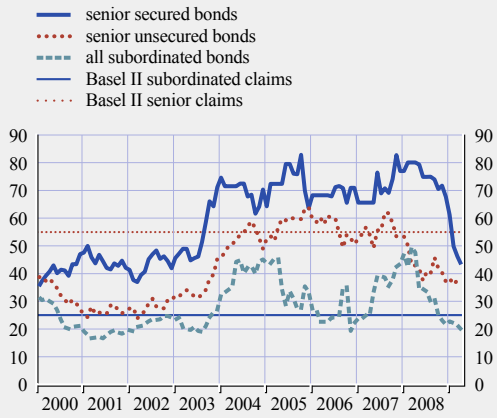
(Jan. 2000 – Apr. 2010; percentage; 12-month trailing sum)




Sources: Moody's and ECB calculations.
Notes: Dashed lines represent one standard deviation of forecast errors. Forecast refers to the 12-months-ahead forecast default rate.

**Chart B Defaulted bond recovery rates of global speculative-grade corporations**

(Jan. 2000 – Apr. 2009; per USD 100; 12-month trailing sum)




Source: Moody's.
Note: Measured by bond prices taken one month after default.

indebtedness and expectations for weak corporate earnings, recovery rates are expected to be relatively low. Indeed, recovery rates are now (significantly) below the values assumed in the foundation approach for the internal rating-based (IRB) method for assessing credit risk in the Capital Requirements Directive (Basel II).[2] The combination of the forecast increase in default rates with the decline in recovery rates suggests significant potential for further losses on these bonds, particularly if they have not been marked to market by their holders.

Given the extreme nature of recent developments in financial markets, it might be reasonable to expect that the performance of models forecasting default rates may be adversely affected in the present environment and that the degree of uncertainty surrounding the forecast rates is considerably higher than normal. It is, therefore, possible that current forecasts may prove to be unduly pessimistic, despite the sharp decline in economic activity. Furthermore, the low recovery rates in Chart B may be biased downwards as they are based on bond prices one month after default in markets that are, arguably, less liquid than in previous years.

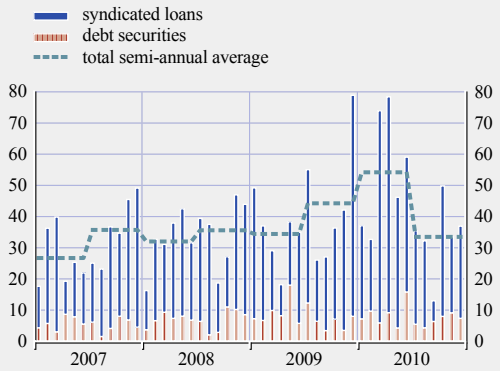
The shock-absorption capacity of the financial system has been tested significantly since mid-2007, and there is greater uncertainty about the extent to which the system's ability to absorb losses has been diminished. That said, the possibility of global and European speculative-grade corporate default rates reaching close to 15% and 20% respectively, with recovery rates falling, presents a significant risk to the financial system.

2 According to anecdotal evidence, about 50% of the typically larger banks that apply the IRB approach use the foundation method. The remaining 50% rely on the advanced IRB approach, whereby banks may – after supervisory approval and subject to meeting minimum standards – use their internal estimates of loss given default, which is equal to one minus the recovery rate.

As regards corporate sector indebtedness, firms entered this economic downturn with a very high leverage ratio (see Chart S51) and their net borrowing continued to increase throughout most of 2008 (see Chart S50). As shown in Chart 2.2, these high levels of debt are accompanied by the need to refinance a large amount of debt that will mature up to mid-2010.

**Chart 2.2 Financing of euro area non-financial corporations via debt securities and syndicated loans reaching maturity**

(Jan. 2007 – Dec. 2010; EUR billions)




Source: Dealogic.
Note: Including debt securities issuance by non-financial corporations via finance vehicle corporations.

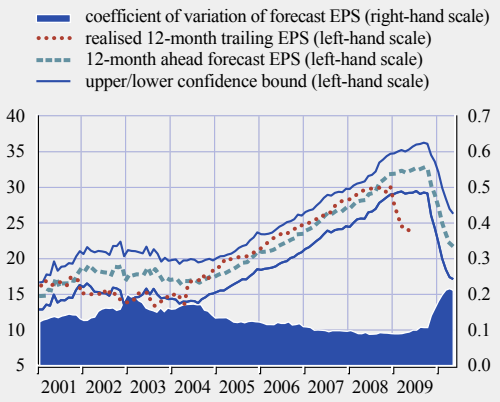
At the same time, lower sales volumes and profit margins caused a substantial weakening of corporate profitability (see Chart 2.3).[2] Looking forward, there are no clear signs of any significant improvement in earnings expectations in particular, given that analysts' earnings expectations remained overly optimistic during the last economic downturn. Hence, strains on internal funding sources in the corporate sector are likely to intensify.

In this environment, the strongest firms are likely to be those with large amounts of cash, whereas others will have to rely on external financing. For example, non-financial corporations increased

2 The increase in earnings per share between 2004 and 2008 overstates the underlying earnings developments as firms distributed their earnings partly via share buybacks, thus inflating this profitability measure and distorting its usefulness for longer-term comparisons.

**Chart 2.3 Earnings per share (EPS) of euro area non-financial corporations**

(Jan. 2001 – May 2010; EUR)




Sources: Thomson Financial Datastream (I/B/E/S) and ECB calculations.
Notes: Based on non-financial corporations included in the Dow Jones EURO STOXX index. Confidence bounds are one standard deviation around the mean 12-month ahead forecast earnings per share (EPS). Data before 2003 are extrapolated from a constant share of the non-financial sector in the total Dow Jones EURO STOXX EPS.

their use of relatively expensive bank overdrafts by 10.0% per annum from August 2007 to March 2009. This compares with an average annual growth of 1.5% in bank overdrafts between 2003 and August 2007.

Some relief for the cost of financing of non-financial corporations came from the monetary policy easing of the ECB, which started to be passed on to bank lending rates at the end of 2008. The cost of market financing via debt and equities, however, remained at elevated levels (see Chart S49).

There has been a considerable degree of heterogeneity in the way in which euro area countries and firms have been affected by the market turmoil. For example, the financial turmoil initially affected mainly large firms, but there is growing evidence that small and medium-sized enterprises also faced tighter financing conditions as from the end of 2008. Furthermore, as expected, cyclical sectors were more affected by the economic downturn, as is evident from sectoral breakdowns of expected default frequencies, actual and forecast earnings developments and corporate bond spreads. For example, the automobile sector is likely to continue to be subject to cyclical, as well as structural, challenges in the months ahead.[3]

## FURTHER RISKS FACED BY THE CORPORATE SECTOR

The challenging operating environment confronting the euro area corporate sector has been further aggravated by uncertainty about the macroeconomic outlook. For example, as measured by the standard deviation of Consensus Economics' euro area GDP forecasts for the current year, uncertainty about the economic outlook in April 2009 was almost three times that of a year earlier. This translates into a substantial increase in uncertainty of 12-month ahead forecast earnings per share in the non-financial sector, which currently exceeds its previous peak of the forecast for December 2002 (see Chart 2.3).

This greater uncertainty is associated with a rise in the tail risk of substantially worse outcomes than generally expected. For example, weaker than expected cash flows, an increase in debt servicing costs or disruptions in the refinancing of existing short-term debt could trigger a further rise in corporate bankruptcies. The associated higher than expected losses for banks could lead to further deleveraging and a tightening of lending standards, thereby reinforcing the adverse feedback loops between the financial sector and non-financial corporations. As there are indications that supply-side effects via banks' balance sheet constraints increased at the end of 2008 (see, for example, Special Feature A, in particular Chart A.1, and Section 4.2), credit conditions might tighten substantially more than already anticipated. Such a development would severely hamper the operations and investment activities of at least some segments of the corporate sector, thus weakening general economic activity even further.

Notwithstanding the signs of supply constraints, the marked slowdown in bank lending to non-

3 The cyclical challenges may be mitigated for some firms in the automobile sector by the support measures put in place by governments in several countries.

financial corporations appears to be dominated by demand-side factors reflecting the impact of the crisis on the real economy. According to the euro area bank lending survey, the main drivers are a decline in firms' financing needs for fixed investment, mergers and acquisitions, and corporate restructuring.

In an extreme case, a substantially stronger than expected decline in economic activity could translate into a manifestation of deflation as discussed in Section 2.1. If this scenario were to materialise, the corporate sector would be particularly hampered as declining prices would raise the real value of the existing high level of corporate indebtedness.

### OVERALL ASSESSMENT OF RISKS IN THE CORPORATE SECTOR

Overall, the euro area corporate sector faces a difficult operating environment, which is not expected to improve substantially in the course of the year, despite some signs of improvement from soft data (e.g. business surveys). Declining or subdued demand hampers firms' ability to generate internal funds. At the same time, external financing conditions are tight, and are likely to remain so as long as banks continue to deleverage and some funding markets remain impaired (see Section 3.2). The continuous increase in firms' indebtedness since 2005 has also made them less resilient to further shocks.

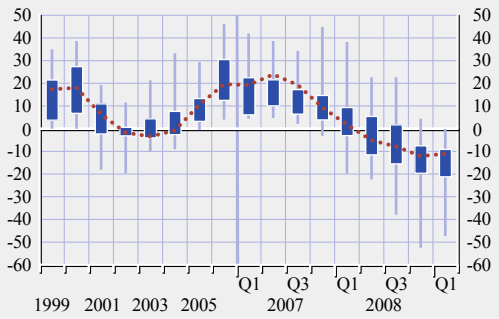
## 2.3 COMMERCIAL PROPERTY MARKETS

### DEVELOPMENTS IN COMMERCIAL PROPERTY MARKETS

Information that has become available since the finalisation of the December 2008 FSR shows that commercial property capital values – i.e. commercial property prices in the euro area, adjusted downward for capital expenditure, maintenance and depreciation – declined by an average of 3.6% in 2008 (see Chart S59). All types of commercial property were affected (see Chart S60). Higher-frequency data for prime commercial property show that in the first quarter of 2009 capital values fell in all euro area countries for which data are available

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

(1999 – Q1 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.

(see Chart 2.4). On average, values declined by 11%, year on year. Conditions remained especially weak in Ireland, where prices declined by some 50%.

In particular, commercial property values were negatively affected by the high cost of funding faced by property investors and the deteriorating economic environment. Together, these reduced demand for rented commercial property space and investment activity. In 2008 investment volumes in Europe declined by 54% compared with 2007. In the fourth quarter of 2008, investment volumes were 70% lower than in the same period in 2007.[4]

### RISKS FACING COMMERCIAL PROPERTY INVESTORS

Income risks have increased for commercial property investors since the finalisation of the December 2008 FSR, mainly due to falling property prices in many countries and low growth in rents, or even declining rents in some countries/segments. Falling prices are likely to pose further challenges for commercial property investors, in particular property funds that have to sell property to finance redemptions. Falling prices are also a concern for loan-financed investors as a large stock of commercial

4 See Jones Lang LaSalle, "Key Market Indicators – Q1 2009", April 2009.

property loans are due to be reset in the coming years, possibly at prices below purchase prices. In addition, falling prices can also lead to further breaches of loan covenants (based on, for example, loan-to-value ratios), which could trigger forced sell-offs.

The growth in rents for commercial property has continued to slow down in recent quarters. In the first quarter of 2009, rents for prime office space fell by, on average, 4% year on year, although developments were heterogeneous across countries. Over the same period, office vacancy rates rose to average 8.8%.[5] Demand for rented commercial property continued to be affected by the slowdown in economic activity. A further reduction in demand cannot be ruled out, given the deteriorating economic outlook since the finalisation of the December 2008 FSR (see Section 2.1) and expected higher tenant default rates in the period ahead (see Section 2.2). Furthermore, the continued weakness of conditions in the euro area labour market is also likely to reduce the demand for rented property (see Section 2.4).

Funding costs and risks for commercial property investors have remained relatively high over the past six months, although commercial property investors have benefited from lower interest rates (see also Section 2.2). Banks continue to apply more conservative lending standards for commercial property loans and some banks' willingness to lend for commercial property investment and development has also continued to be muted as a result of the very low levels of activity in the market for commercial mortgage-backed securities (CMBSs) (see Section 3.2).

### OVERALL ASSESSMENT OF RISKS IN COMMERCIAL PROPERTY MARKETS

Conditions in commercial property markets have continued to deteriorate in the euro area over the past six months. Looking ahead, the outlook will remain unfavourable until economic and financial conditions improve and investor appetite for commercial property returns. Further losses for banks[6] and investors with exposures to commercial property are therefore likely in the period ahead and constitute a significant risk for financial sector stability.

## 2.4 BALANCE SHEET CONDITION OF THE HOUSEHOLD SECTOR

The overall assessment of household sector balance sheets as a potential source of risk from a financial stability perspective has deteriorated since the finalisation of the December 2008 FSR. However, the risks still remain contained.

As anticipated in the December 2008 FSR, the outlook for the labour market and household income has not only deteriorated further in recent months, but it has done so by more than expected. This has more than offset the positive influence of a slight decline in the debt-to-income ratio and the reduction in interest rates. Looking forward, the macroeconomic environment is expected to continue to have a negative effect on household sector balance sheets.

### HOUSEHOLD SECTOR LEVERAGE

Total MFI loan growth to the household sector declined to an annual rate of 0.9% in the first quarter of 2009, from 2.8% in the previous quarter and around 5% in the first half of 2008. It fell further in April 2009, to 0.1% (see chart S93). This moderation in MFI lending growth to households can be attributed to a deceleration in borrowing for both house purchase and consumer credit (see Chart S61).

The recent pattern of loan growth, which is in line with the downward trend observed since early 2006, reflects the ongoing moderation in house price inflation and weakening economic conditions and prospects.[7] At the same time, the ongoing tightening of credit standards indicates that supply factors may also have played a role.

5 See Jones Lang LaSalle, "Key Rental Market Indicators – Q1 2009", April 2009.

6 On average, commercial property loans in the euro area account for more than 10% of total loans, but exposures can be much larger for some large institutions.

7 The pattern of decline is also affected by the increase in true-sale securitisation activities that reduces the level of loans in bank balance sheets.

Looking forward, according to the results of the April 2009 bank lending survey, a further dampening of households' demand for housing loans is expected due to worsened housing market prospects and deteriorating consumer confidence.

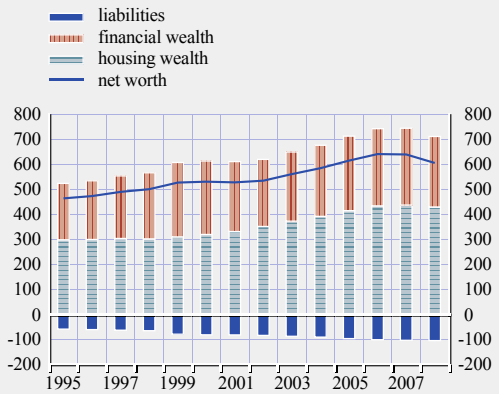
Turning to the holding of assets by households, which provides an indication of the ability of the sector to repay its debt at an aggregate level, the value of household assets is estimated to have declined slightly in 2008, following a levelling-off in 2007. At the same time, the value of debt is thought to have increased slightly. As a result, the net wealth of households is estimated to have declined somewhat in 2008 (see Chart 2.5). Overall, considering the potential ability of households to repay debt, the ratio of debt to total wealth is estimated to have remained relatively stable in 2008, as compared with previous years (see Chart S64).

## RISKS FACING THE HOUSEHOLD SECTOR

Developments in interest rates and income are the two main sources of risk affecting the ability of households to service their debt. While interest rate risks have declined somewhat, risks related to household income have increased over the past six months.

### Chart 2.5 Household sector net worth in the euro area

(1995 – 2008, percentage of gross disposable income)




Sources: ECB and Eurostat (Quarterly Euro Area Accounts) and ECB calculations.
Note: Data for housing wealth after 2003 are based on estimates. Figures for 2008 are based on information available up to the third quarter.

### Interest rate risks of households

After the finalisation of the December 2008 FSR, the ECB reduced its key interest rates by 225 basis points, bringing the cumulative decline since July 2008 to 325 basis points. This, together with the slowdown in household borrowing, has led to a slight decline in households' overall debt servicing burden in the second half of 2008. In particular, interest payments are estimated to have stabilised at around 3.8% of disposable income in the last quarter of 2008 (see Chart S65).

It is worth stressing that the risks affecting the financially most vulnerable segments of the population cannot be properly assessed by looking at aggregate data. In particular, indebted households at the lower end of the income distribution scale face a higher risk. According to micro-data based on a survey across the EU conducted in 2005, the most vulnerable households (namely those in the lowest income groups or where the head of household is unemployed) tend to be those with higher debt servicing ratios, and these represent a considerable proportion of the population (see Box 6 for more details). The structural nature of these indicators suggests that these results are still meaningful for assessing vulnerabilities in the household sector today.

Overall, the interest rate risk faced by households has declined somewhat since the finalisation of the December 2008 FSR, and is expected to remain subdued looking forward.

### Risks to household income

The developments in household income, which are very much linked to developments in the labour market, are one of the most important predictors of households' ability to meet their debt-servicing obligations.

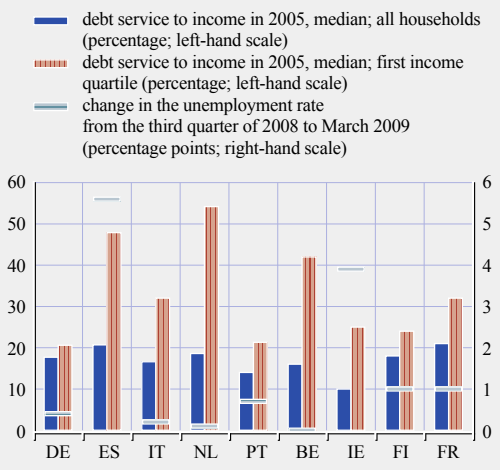
The macroeconomic environment in the second half of 2008 deteriorated further in terms of both

economic and employment growth, leading to an increase in income-related risks for households. In fact, there was a reversal in the trend in euro area unemployment, which increased to 8.9% in March 2009, from 7.6% in the third quarter of 2008.

The deterioration in labour market conditions (and the income risks posed thereby) is not broadly based across euro area countries either. In particular, significant increases in the unemployment rate have been recorded in Spain and Ireland. In Spain, this is accompanied by a relatively high debt servicing ratio, especially for those in the lowest income quartile (see Chart 2.6). Overall, the combination of negative labour market developments and high levels of indebtedness may be indicative of greater income-related risks.

The rising percentage of loans in arrears in some euro area countries is leading to the introduction of some household relief measures (such as loan modifications and maturity extensions) that are aimed at reducing the number of foreclosures. Looking forward, the expected decline in the level of employment in line with the developments recorded in the last quarter of 2008 would lead to a further increase in total unemployment. At the same time, real income is expected to remain subdued in the next few quarters.

**Chart 2.6 Debt servicing-to-income ratio and unemployment rate developments in euro area countries**




Sources: Eurostat, ECB and ECB calculations.
Note: The debt servicing-to-income ratio refers to households holding a mortgage; for Belgium and Ireland, debt servicing is proxied by the total housing cost. Unemployment developments for Italy refer to December 2008, instead of March 2009.

### Risks to residential property prices

Euro area house price inflation continued to ease in 2008, thereby extending a moderating trend that followed strong valuation growth in the period leading up to 2005. Euro area annual house price inflation has declined steadily from a peak of 7.7% in the first half of 2005 to 0.6% in the second half of 2008 (see Chart S67).[8] At the country level, a marked slowdown in residential property price inflation was recorded for most euro area countries in 2008 and early 2009, with at least six euro area countries (Ireland, Spain, France, Malta, the Netherlands and Finland – see Table S4) recording a recent outright decline in house prices on an annual basis. More generally, the data suggest that 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.

These developments have been associated with a moderation in both housing demand and the supply of housing. On the demand side, "crude" or narrow housing affordability over the past decade – defined as the ratio of households' disposable income to the house price index – has generally fallen as a result of strong house price increases (see Chart S66). While this basic measure of affordability has recently improved somewhat, borrowing conditions – which had previously helped to offset this declining crude affordability – have generally tightened for households since early 2006, reflecting a general increase in the nominal interest rates applied to loans to households for house purchase through the end of 2008. It is likely that changes in

8 These data should be interpreted with caution, given issues related to coverage, quality control and representativeness, particularly in an environment of low transactions in certain jurisdictions.

expected returns on housing have also been influencing euro area housing demand.[9] Within this environment of subdued housing demand, there have also been signs of rapidly receding housing supply. Real housing investment in the euro area moderated markedly over the course of the past year, as the share of resources devoted to housing construction in the economy has subsided in a context of house price moderation (see Chart S46). Moreover, despite this ongoing correction in euro area house prices, their evolution relative to rental yields still indicates that some overvaluation seems to persist (see Chart S68). Thus, a subdued evolution of euro area house prices and housing activity is likely to continue 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 in the latter respect will be the re-absorption of resources elsewhere in the economy, particularly in those countries where the correction in housing sector activity is most pronounced.

### OVERALL ASSESSMENT OF RISKS IN THE HOUSEHOLD SECTOR

Overall, risks to the euro area financial sector originating from the household sector, although contained, have increased in recent months. While, the debt servicing burden has started to decline, following the continued deceleration of lending to households and recent declines in interest rates, a further deterioration in the macroeconomic environment, in particular the labour market, poses higher risks to household income.

9 Specifically, in addition to the evolution of the rental yield, stable low-frequency variation in expected returns may also have contributed to large and persistent swings in euro area house prices (see P. Hiebert and M. Sydow, "What drives returns to euro area housing? Evidence from a dynamic dividend discount model", *ECB Working Paper*, No 1019, March 2009).

**Box 6**

### DEBT SERVICING RATIO AND HOUSEHOLD CHARACTERISTICS IN THE EURO AREA

Available macroeconomic data from sectoral accounts indicate that the debt servicing ratio of euro area households remained at a relatively stable level of around 9-10% between 1991 and 2005, before increasing slightly to 11% in 2007. Aggregated information is of limited value when trying to qualify the risk to financial stability stemming from household income. For example, risks would be rather high should the bulk of mortgages be concentrated on the lowest income or unemployed borrowers. As such, whenever possible, it is important to complement the aggregate developments with micro-level information, to assess how broadly or narrowly the debt servicing ratio is distributed across the population according to different characteristics, in particular income.

This box uses the microdata derived from the EU Statistics on Income and Living Conditions (EU-SILC) to present estimates of the debt servicing ratio across household characteristics. It is worth clarifying a few issues related to the information derived: (i) the debt servicing ratio is computed as the percentage of total housing costs of the household, which includes mortgage interest payments and the cost of utilities, among other costs, over total disposable income of the household; this means that this ratio is not directly comparable with the aggregate figure; (ii) the computations are made for households with mortgages outstanding, which is the main

component of household debt; (iii) figures refer to the median, as a way of controlling for extreme values; (iv) the data cover most euro area countries;[1] and (v) data refer to 2005, although, given the structural nature of these statistics and the duration of mortgage contracts, the information provided is of value for assessing the current risks to financial stability posed by the household sector.

The first two columns of the table below show the median of the debt servicing ratio and the percentage of households with an outstanding mortgage according to the level of income and other characteristics of the head of household, including age, work status, level of education and migration status – the respective weights are given in brackets. All in all, the survey results suggest that the assessment of risks stemming from euro area mortgage markets may be underestimated when looking only at aggregated statistics. This is because the most vulnerable households tend to be those with higher debt servicing ratios. In particular, the survey indicates that the debt servicing ratio is negatively correlated with the *level of income* of the household,

1 Euro area figures are defined as the weighted average (using GDP weights adjusted for purchasing power parity (PPP)) of the results for Belgium, Germany, Finland, France, Ireland, Italy, the Netherlands and Portugal, which represented around 80% of euro area GDP in 2005.

**Debt servicing ratios for euro area households with mortgages outstanding, according to various characteristics**

(2005; median value as a percentage of disposable income)

| | Median for debtors | | % Households with mortgage outstanding | % Debtors with ratio above 40% | % Debtors with arrears | Minimum income to make ends meet relative to income declared (%) |
|---|---|---|---|---|---|---|
| All households | 15.3 | | 20.9 | 6.5 | 3.3 | 79 |
| *Percentile of income* | | | | | | |
| <20 | 39.6 | *(0.20)* | 4.0 | 46.5 | 10.3 | 171 |
| 21-40 | 23.4 | *(0.20)* | 10.5 | 14.9 | 6.4 | 112 |
| 41-60 | 18.5 | *(0.20)* | 19.7 | 6.3 | 4.6 | 92 |
| 61-80 | 15.5 | *(0.20)* | 31.3 | 3.7 | 2.2 | 80 |
| 81-90 | 13.1 | *(0.10)* | 37.2 | 2.7 | 2.2 | 70 |
| 91-100 | 10.3 | *(0.10)* | 39.9 | 1.5 | 1.2 | 55 |
| *Age (head of household)* | | | | | | |
| <35 | 17.6 | *(0.17)* | 20.0 | 7.0 | 3.4 | 80 |
| 35-44 | 16.0 | *(0.23)* | 35.7 | 6.9 | 3.5 | 80 |
| 45-54 | 13.8 | *(0.21)* | 29.3 | 5.0 | 3.3 | 77 |
| 55-64 | 14.0 | *(0.17)* | 17.6 | 6.9 | 2.1 | 79 |
| 65-74 | 16.6 | *(0.14)* | 7.9 | 8.6 | 5.0 | 92 |
| 75+ | 18.1 | *(0.08)* | 2.1 | 7.1 | 2.2 | 96 |
| *Work status (head)* | | | | | | |
| Employee | 14.8 | *(0.47)* | 31.3 | 4.9 | 2.5 | 77 |
| Self-employed | 16.5 | *(0.09)* | 28.0 | 12.5 | 4.9 | 83 |
| Unemployed | 17.9 | *(0.05)* | 12.6 | 12.4 | 10.8 | 91 |
| Inactive | 16.3 | *(0.38)* | 8.1 | 9.1 | 4.1 | 88 |
| *Level of education (head)* | | | | | | |
| Low | 14.4 | *(0.24)* | 6.3 | 11.6 | 3.9 | 71 |
| Medium | 15.9 | *(0.58)* | 20.5 | 6.6 | 3.7 | 82 |
| High | 13.9 | *(0.18)* | 28.7 | 5.7 | 2.4 | 72 |
| *Migration status (head)* | | | | | | |
| Non-migrant | 15.3 | *(0.91)* | 21.4 | 6.3 | 3.1 | 79 |
| Migrant within EU | 12.4 | *(0.02)* | 19.0 | 4.5 | 2.5 | 93 |
| Migrant from outside EU | 16.7 | *(0.07)* | 13.9 | 9.1 | 5.9 | 93 |

Sources: EU Statistics on Income and Living Conditions (EU-SILC) and ECB calculations.
Note: The first column includes the proportion of each sub-group in brackets.

i.e. the higher the level of income, the lower the ratio of debt service to income. Moreover, it also shows that, compared with the other characteristics considered, there is greater variation in the debt servicing ratio for income levels. Indeed, for the first income group (including households in the lowest 20 percentiles), the debt servicing ratio, at around 40%, is almost four times that of the fifth income group (households above the 90th percentile). It should be recognised, however, that the proportion of households with mortgages outstanding tends to grow with the level of income. As regards *work status*, the ratio is highest for those households in which the head is unemployed (17.9%) and lowest for those households in which the head of household is an employee (14.8%). Turning to the *level of education*, those households in which the head has a high-level education (tertiary education) have the lowest debt servicing ratio (13.9%), while the highest level appears to be linked to those households in which the head has an intermediate education level (15.9%). Finally, with respect to *migration status*, migrants from outside the EU have a higher ratio (16.7%), migrants from within the EU have a smaller ratio (12.4%), and the ratio for non-migrants is inbetween the other two.[2]

The table also shows another three measures of financial stress at the household level. The first is the proportion of households for which the debt servicing ratio is above 40% (column 3), the second is the percentage of households with arrears (column 4) and the third, which is more subjective, is derived from the ratio between the lowest monthly income to make ends meet declared by households and the level of income effectively obtained (column 5). All of these measures tend to confirm the link with household characteristics described for the debt servicing ratio, and, in some cases, to reinforce it. For instance, the link with the *level of income* tends to be much more marked, e.g. the percentage of households with a debt servicing ratio of above 40% in the lowest income group is 46.5%, while it is 1.5% for those with the highest income. Also, for *work status*, the situation for the unemployed seems much worse in relative terms than for the employees regarding the percentage of debtors with a debt servicing ratio above 40% and the percentage of debtors with arrears, while for the *level of education,* households with the highest level of education are in a better situation relative to those with the lowest level, for example the percentage of debtors with a debt servicing ratio above 40% is 5.7% and 11.6% respectively.

Looking forward, an intensification of the economic downturn could have a negative impact in the level of income and could result in an increase in the number of people unemployed. Therefore, all other things being equal, an increase in the proportion of households in the lowest income levels and in that with a head of household who is unemployed, should translate not only into a higher debt servicing ratio for those households with a mortgage outstanding, but also into an increase in the level of financial stress measured, for instance by debtors with arrears and households with a perceived level of income below that needed to make ends meet. It should be acknowledged, however, that euro area figures hide a great disparity of situations amongst euro area countries.[3]

2 The results described are confirmed using a multivariate approach.
3 See Box 1 in Task Force of the Monetary Policy Committee of the European System of Cental Banks, "Housing finance in the euro area", *ECB Occasional Paper*, No 101, March 2009.

# III THE EURO AREA FINANCIAL SYSTEM

## 3 EURO AREA FINANCIAL MARKETS

*Since late November, conditions in the euro money market have improved, not least because of supportive central bank measures. Some banks, however, have remained heavily dependent on central bank funding.*

*Government bond markets have been characterised by increased discrimination among investors vis-à-vis different euro area sovereign issuers, in large part because of intensified concerns about the fiscal sustainability risk created by national financial rescue and economic stimulus packages.*

*In contrast to speculative-grade debt, the demand for, and issuance of, investment-grade corporate bonds has rebounded markedly, while asset-backed securities markets have remained largely dysfunctional and market participants should, therefore, continue to implement various public and private initiatives aimed at restoring securitisation markets. Increased public borrowing might crowd out some investments into private debt, and it would be prudent for borrowers to consider various alternative funding sources well before the actual rollover of maturing debts, as well as to avoid too high a reliance on short-term borrowing despite low short-term interest rates and investors' preference for such debt.*

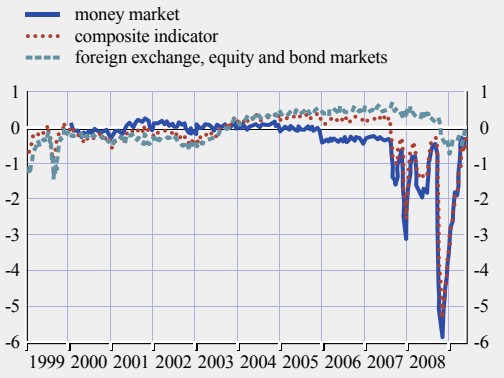
*Notwithstanding a rally in equity markets, high option-implied volatility and the uncertainty about the macro-financial outlook cast doubt on the sustainability of the recovery and market participants should remain vigilant with respect to their investments and counterparty credit exposures.*

### 3.1 KEY DEVELOPMENTS IN THE MONEY MARKET

Market liquidity in the euro money market – as measured by the financial market liquidity indicator shown in Chart 3.1 – improved significantly after the finalisation of the December 2008 Financial Stability Review (FSR), but still remained below the pre-turmoil levels at the end of May. Since mid-February 2009, further signs of improved money market liquidity have also been seen in the lower utilisation of the ECB's deposit facility (see Chart 3.2) and higher overnight unsecured interbank transaction volumes (see Chart 3.4). These improvements were largely the consequence of the policy measures that were taken by the Eurosystem.

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

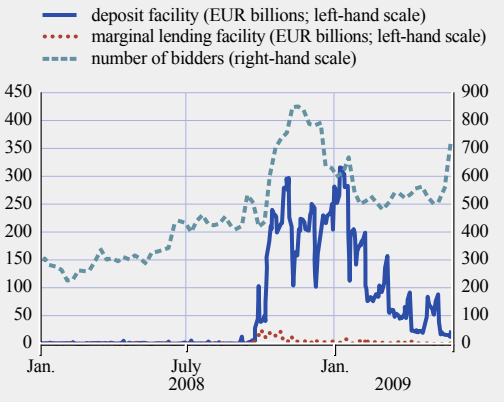
(Jan. 1999 – May 2009)




Sources: ECB, Bank of England, Bloomberg, JPMorgan Chase & Co., Moody's KMV and ECB calculations.
Note: The composite indicator comprises unweighted averages of individual liquidity measures, normalised on the period 1999-2006 (non-money market components) and 2000-2006 (money market components). The data shown have been exponentially smoothed. For more details, see Box 9 in ECB, *Financial Stability Review*, June 2007.

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

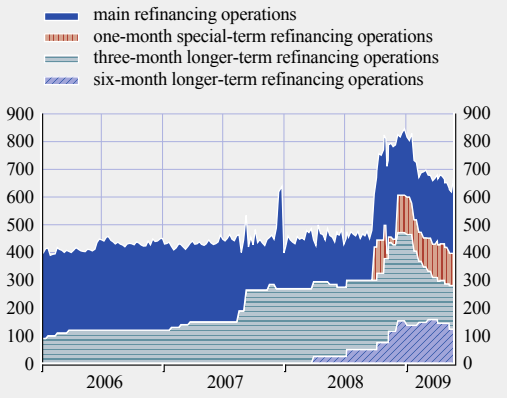
(Jan. 2008 – May 2009)




Source: ECB.

**Chart 3.3 Breakdown of Eurosystem liquidity-providing operations by maturity**

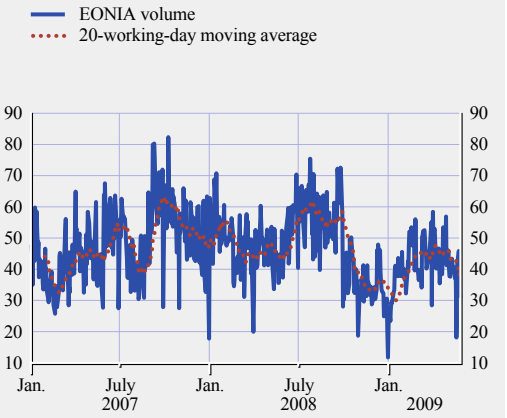
(Jan. 2006 – May 2009; EUR billions)




Source: ECB.

**Chart 3.4 EONIA volume**

(Jan. 2007 – May 2009; EUR billions)




Source: ECB.

The measures taken by the Eurosystem were aimed at restoring the functioning of the money market and alleviating the extreme levels of stress that prevailed after the failure of Lehman Brothers. They included (i) the introduction of a fixed rate tender procedure for the main refinancing operations, meaning that the Eurosystem met in full all bids received in the euro liquidity-providing operations at a preset policy rate; (ii) the temporary narrowing of the corridor between the standing facility rates from 200 to 100 basis points and (iii) the expansion of the list of assets eligible as collateral in Eurosystem credit operations.

As a result of these measures, the intermediation role of the Eurosystem increased significantly (see also Box 7): between mid-September and the end of 2008, the amount of outstanding euro liquidity-providing operations almost doubled (see Chart 3.3), while the use of the deposit facility remained at record levels (see Chart 3.2).

The redistribution of liquidity within the interbank market remained severely impaired towards the end of 2008. Indeed, interbank lending had contracted even at the shortest maturities, as evidenced by a decline in the daily EONIA volume (see Chart 3.4). However, the abundant liquidity provided by the Eurosystem led to a substantial downward drift of very short-term money market interest rates to levels significantly below the policy rate. This also fed through to longer maturities and, together with the cumulative ECB interest rate cuts, contributed to a substantial decline in the unsecured interest rates along the money market yield curve. At the same time, EURIBOR/OIS spreads narrowed significantly from the record high levels that prevailed in October 2008 (see Chart 3.5).

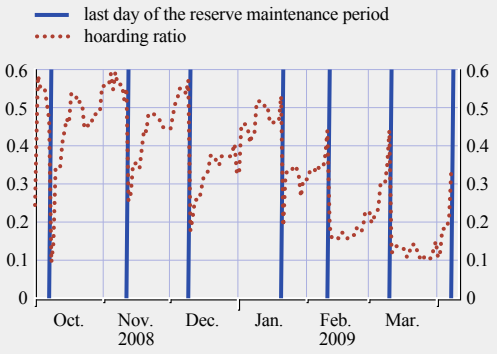
Box 7

## MONEY MARKET INTERMEDIATION AND LIQUIDITY INSURANCE

Following the change to a fixed rate tender procedure with full allotment as of the maintenance period beginning on 8 October 2008, aggregate liquidity provision in Eurosystem refinancing operations increased significantly, exceeding the strict needs resulting from autonomous factors and reserve requirements. The aggregate excess liquidity has been reflected in an elevated recourse to the deposit facility of the Eurosystem. This box discusses some factors that may help to explain the demand for excess liquidity by focusing on the financial stability dimension of the operational framework for monetary policy implementation in times of financial market stress. In fact, the empirical evidence suggests that, in addition to partially taking over the intermediation of liquidity shocks from the market, the Eurosystem has offered banks insurance against liquidity uncertainty and has therefore contributed actively to operational and financial stability.

**Ratio of recourse to the ECB's deposit facility over outstanding longer-term refinancing operations**

(Oct. 2008 – Apr. 2009, six reserve maintenance periods)




Sources: ECB and ECB calculations.

A look at the ratio of recourse to the deposit facility over outstanding longer-term refinancing operations (LTROs) – which is a measure of liquidity hoarding by banks (hereinafter referred to as the hoarding ratio) – reveals a clear intra-maintenance period pattern, as well as a declining trend in recent months (see chart). The former pattern can be attributed to banks' desire to frontload the fulfilment of their reserve requirements. In the presence of aggregate excess liquidity, therefore, recourse to the deposit facility increases towards the end of the reserve maintenance period.[1] Controlling for these structural elements, the remaining variation in the recourse to the deposit facility can be explained by four factors (see the model results in the table):[2]

a) overall financial market stress (as measured by the VIX, an index of implied stock market volatility);
b) the difference between EONIA and the minimum bid rate;
c) the re-widening of the interest rate corridor as from 21 January 2009;[3] and
d) the lagged hoarding ratio (in the error correction model).

1 The abrupt decline in the recourse to the deposit facility on the last day of the reserve maintenance period results from the fact that an absorbing operation at higher rates usually takes place on the last day of each reserve maintenance period. Without such an operation, the aggregate recourse to the deposit facility on that day would likely be higher than on any other day during the maintenance period.

2 Two asymptotically identical approaches were considered. One involves estimating an error correction model of differences in the daily recourse to the deposit facility, while the second consists in estimating the hoarding ratio directly. The first approach takes the dynamic adjustment to equilibrium into account, while the second stipulates a reduced form and hence amounts to estimating the long-run equilibrium directly. The relationship between the two approaches becomes visible by solving the error correction model for its long-run equilibrium values. These values are within one standard deviation from the estimates obtained using the reduced form model.

3 From October 2008 to January 2009, the interest rate corridor formed by the rates on the standing facilities of the Eurosystem was narrowed to 100 basis points (from 200 basis points).

**Estimation results from the error correction model**

| Δ log deposit facility | Coefficient | t-statistic |
|---|---|---|
| Constant | -1.174 | -3.13 |
| Δ log LTRO | 0.742 | 1.94 |
| log hoarding ratio$_{t-1}$ | -0.245 | -5.34 |
| log VIX$_{t-1}$ | 0.221 | 2.45 |
| Spread of EONIA over minimum bid rate$_{t-1}$ | -0.395 | -3.81 |
| Rewidening of the interest rate corridor (dummy variable) | -0.327 | -4.87 |
| Daily reserve surplus | -0.001 | -1.61 |
| Last day of reserve maintenance period (dummy variable) | -0.588 | -9.28 |

Source: ECB calculations.
Note: Estimation is based on 124 observations over six reserve maintenance periods, $R^2 = 0.55$.

Theoretically, two different factors of demand for refinancing with the Eurosystem can be distinguished. The first is the partial replacement of private sector intermediation of liquidity shocks by the Eurosystem owing to the fear of adverse selection by money market participants. This leads to a drying-up of money market transactions as a result of the reduction in external credit lines of banks (credit rationing). The second is an increased preference for holding liquidity buffers in the presence of an increased variability and likelihood of liquidity shocks and fear of sudden credit events. Furthermore, in the econometric modelling, an error correction term captures the idea that changes in daily recourse to the deposit facility are one way of achieving an average (targeted) hoarding ratio.

Both demand factors have important financial stability implications. While re-intermediation of liquidity shocks contributes directly to the stability of the banking sector by guaranteeing a smooth fulfilment of arising payments, the provision of insurance in the form of liquidity buffers allows banks to adjust their day-to-day liquidity position in times of greater uncertainty, which promotes operational and financial stability.

The econometric evidence suggests that increasing financial market tensions, gauged by the volatility index, lead to increasing recourse to the deposit facility.[4] The intuition behind this finding is that stock market volatility is correlated with banks' asset volatility which, in turn, may cause sudden rating downgrades and change the funding position of the bank. Both factors contribute to retrenchment from interbank lending and thereby increase the re-intermediation role of the Eurosystem. The finding can also be interpreted as banks' natural reaction to an increased overall risk aversion in the market: increasing liquidity buffers is an optimal response in such an environment.

The spread between EONIA and the minimum bid rate is a measure of the prevailing opportunity costs of obtaining funds from the Eurosystem (instead of using the overnight market) and a measure of excess liquidity at overnight maturity. Higher opportunity costs and excess liquidity will lower the demand for central bank refinancing and hence lower the recourse to the deposit facility, which is captured by the negative coefficient of the spread.

Finally, the re-widening of the interest rate corridor between the marginal lending facility and the deposit facility from 100 basis points to 200 basis points on 21 January led to a decrease in recourse to the deposit facility. Economically, a re-widening of the interest rate corridor increases the cost of insurance against liquidity shocks, since funds demanded for insurance purposes are obtained at the policy rate with the expectation of parking those funds in the deposit facility.

4 While the main specification referred to in the text is an error correction model with the change in the daily recourse to the deposit facility on the left-hand side and variables a) to d) on the right-hand side, a range of alternative approaches were used to check for robustness in the presence of data limitations. The results are preserved under each approach, while the quantitative dispersion is limited.

The estimates suggest that the marginal effect of financial market volatility is somewhat smaller than that of the re-widening of the interest rate corridor, although the former variable captures more of the variation in recourse to the deposit facility. The largest marginal effect is observed via the opportunity cost measure (the spread). The re-widening of the interest rate corridor is estimated to have contributed to a reduction in recourse to the deposit facility in the range of €40 to €50 billion. The strength of the effect, as well as its robustness, regardless of the chosen econometric approach, reveals the presence of a strong insurance motive behind the elevated demand for Eurosystem refinancing after 8 October 2008.

Overall, in times of unprecedented financial market stress that puts severe strains on the financial system, the flexibility of the operational framework for monetary policy implementation of the Eurosystem can be seen as contributing to safeguarding financial stability.

In order to provide incentives for banks to increase interbank lending, as of 21 January 2009 the ECB restored the interest rate corridor between the standing facilities to ±100 basis points around the policy interest rate. As a result, the ECB's intermediation role decreased, albeit very gradually, and was accompanied by a pick-up in interbank lending volumes, although primarily at shorter maturities. Banks started to lend more to each other and their excess reserves with the Eurosystem diminished.

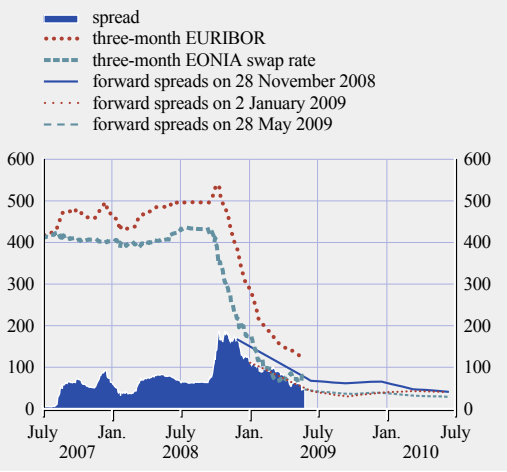
On 5 March 2009, the ECB announced that it would continue the fixed rate tender procedure with full allotment for its refinancing operations for as long as needed, and in any case beyond the end of 2009. This provided strong assurance for money market participants regarding the unlimited availability of collateralised liquidity from the ECB and thereby reinforced positive sentiment.

On 7 May 2009, a further set of measures, aimed at enhanced credit support, were announced. These measures encompassed (i) the introduction of liquidity-providing longer-term refinancing operations with a maturity of 12 months; (ii) purchases of euro-denominated covered bonds issued in the euro area and (iii) granting the European Investment Bank counterparty status for the Eurosystem's monetary policy operations. Aimed at promoting recovery in the term money and other funding markets, the announcement of these measures provided additional impetus to gradually improving conditions at the longer end of the money market maturity spectrum, whereas spreads narrowed in the covered bond market. Furthermore, the main policy interest rate was reduced to 1% and the interest rate corridor between the standing facility rates was narrowed to ±75 basis points.

Although conditions in the euro money market had improved by the end of May, various indicators suggest that market liquidity conditions still remained strained (see Chart 3.1 and Box 8). Forward EURIBOR/OIS spreads indicated expectations of some tentative tightening of spreads in 2009, but it was anticipated to be very gradual (see Chart 3.5).

**Chart 3.5 Contemporaneous and forward spreads between EURIBOR and EONIA swap rates**

(July 2007 – July 2010; basis points)




Source: Bloomberg.

Interbank lending volumes beyond the one-month maturity remained limited and there was reportedly little turnover behind declining EURIBORs for maturities exceeding three months. Among other factors, the reluctance of money market funds to invest in money market instruments with longer maturities, stemming from a fear of considerable withdrawals, reinforced the concentration of liquidity at the front end of the money market yield curve, although this reluctance seemed to have waned somewhat in May 2009.

Widespread risk aversion and counterparty risk concerns (see Chart S70) continued to underpin the segmentation of the euro money market on the basis of perceived creditworthiness. This continued to impair access to interbank funding for some banks and reinforced their reliance on central bank funding.

**Box 8**

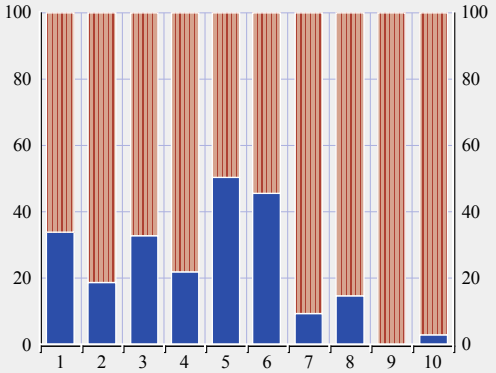
## INDICATORS OF LIQUIDITY IN THE EURO MONEY MARKET

Since August 2007 the euro money market has experienced severe disruptions as a result of contagion from shocks in other market segments, an increased preference for liquidity and heightened counterparty credit risk concerns. However, changes in liquidity conditions have not been homogeneous across the various segments of the euro money market. This box presents a simple "barometer" which can help in the monitoring of market conditions across those segments.

The barometer consists of eight indicators of money market functioning, covering the following segments: unsecured deposits (EONIA volume, standard deviation of the three-month EURIBOR), repos (EURIBOR/EUREPO spread, standard deviation of the three-month EUREPO), euro commercial paper (ECP outstanding), interest rate futures (trading volume of EURIBOR futures), swaps (bid-ask spread of EONIA swaps), and the foreign exchange swap market (US dollar basis swap spread). Two additional indicators reflect the degree of intermediation by the ECB (number of bidders in the main refinancing operations and total use of the marginal lending facility and of the deposit facility). The barometer compares the level of each indicator on a certain day with its pre-turmoil level (calibrated as zero on the scale) and with its level at the "peak" of the turmoil (calibrated as 100). While the pre-turmoil readings are taken on the same day for all indicators, the day corresponding to the turmoil "peak" level is different for each indicator. Charts A to C show this barometer at three different stages in the recent market turmoil.

**Chart A Euro money market barometer on 1 January 2008**

(percentages; pre-turmoil level taken on 16 July 2007)

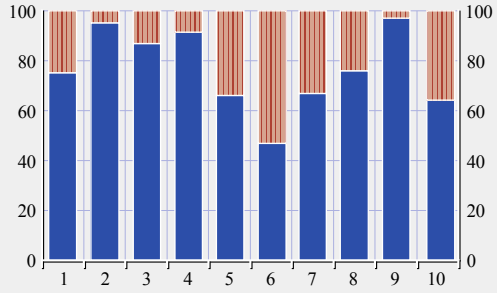



1 EONIA volume
2 standard deviation of EURIBOR
3 EURIBOR/EUREPO spread
4 standard deviation of EUREPO
5 ECP outstanding
6 EURIBOR futures trading volume
7 EONIA swap bid-ask spread
8 USD implied rate vs. USD LIBOR
9 number of bidders in main refinancing operations
10 total use of marginal lending facility and deposit facility

Sources: Bloomberg, European Banking Federation, CPWare and ECB calculations.

**Chart B Euro money market barometer on 1 December 2008**

(percentages; pre-turmoil level taken on 16 July 2007)

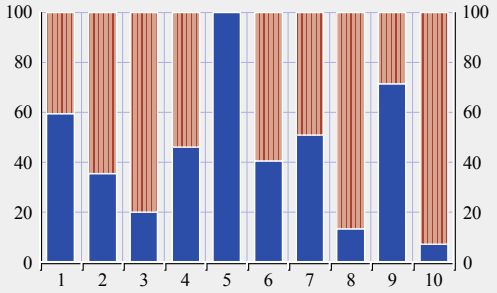



1 EONIA volume
2 standard deviation of EURIBOR
3 EURIBOR/EUREPO spread
4 standard deviation of EUREPO
5 ECP outstanding
6 EURIBOR futures trading volume
7 EONIA swap bid-ask spread
8 USD implied rate vs. USD LIBOR
9 number of bidders in main refinancing operations
10 total use of marginal lending facility and deposit facility

Sources: Bloomberg, European Banking Federation, CPWare and ECB calculations.

**Chart C Euro money market barometer on 28 May 2009**

(percentages; pre-turmoil level taken on 16 July 2007)




1 EONIA volume
2 standard deviation of EURIBOR
3 EURIBOR/EUREPO spread
4 standard deviation of EUREPO
5 ECP outstanding
6 EURIBOR futures trading volume
7 EONIA swap bid-ask spread
8 USD implied rate vs. USD LIBOR
9 number of bidders in main refinancing operations
10 total use of marginal lending facility and deposit facility

Sources: Bloomberg, European Banking Federation, CPWare and ECB calculations.

The collapse of Lehman Brothers in September 2008 heightened perceived counterparty risks and led to a sharp reduction in liquidity across money market segments (see Chart B). Liquidity dried up even for the shortest maturities and secured transactions, while trading in interest rate futures and swaps was negatively affected by extreme volatility and widespread deleveraging. The dysfunction of the euro money market prompted the ECB to assume a greater intermediation role. From the beginning of 2009, liquidity conditions improved across most segments of the euro money market. However, this improvement was very gradual and liquidity conditions remained far from pre-turmoil levels (see Chart C).

The functioning of the secured segment of the money market was also adversely affected by the failure of Lehman Brothers. This occurred because the event triggered a dramatic increase in perceived counterparty risk among market participants. This led to further reductions in counterparty credit limits. Simultaneously, many banks accelerated the pace of deleveraging their balance sheets.

The International Capital Market Association's most recent semi-annual European repo market survey, conducted in December 2008, showed a dramatic decline in the size of the euro secured money market. For instance, the overall value of repo contracts outstanding fell from €6.5 trillion in June 2008 to €4.6 trillion in December 2008. For a constant sample of survey participants, the contraction of 26% was the largest since the first survey of this kind was conducted in 2001.

Greater risk aversion was also reflected in an increased preference for short maturities and high-quality collateral, as well as, in particular, in the larger share of anonymous trading cleared through a central counterparty (CCP). The share of outstanding repo contracts that were anonymously traded and cleared with a CCP rose from 13% in June 2008 to a record high of

18% in December, according to the survey.[1] The balance sheet efficiency achieved through netting and the elimination of the direct credit counterparty risk, which helped to circumvent non-existent or reduced credit lines, contributed to the rapid growth of CCP repos. As liquidity in the term repo market remained severely impaired, market participants were increasingly attracted by the advantages provided by the CCP facilities.

Reflecting the importance of, and preference for, collateralised lending that resulted from increased risk aversion, Banca d'Italia, together with the operator of the e-MID electronic interbank market (e-MID SIM), launched an initiative to revive interbank lending. The "Mercato Interbancario Collateralizzato" (MIC) scheme started operating on 2 February 2009 and provided a platform for collateralised and anonymous interbank lending with terms from one week to six months.[2] Daily trading activity on the platform gradually increased and the outstanding amount reached €4.1 billion at the end of April 2009, but then declined slightly in May 2009. Nevertheless, already by the end of March 2009, the outstanding amount of MIC deposits exceeded that of the e-MID unsecured market for maturities from one week to six months.

The bankruptcy of Lehman Brothers also marked a turning point for the euro commercial paper (ECP) market. In particular, there was a steep decline in the ECP amounts outstanding and the number of trades. After a tentative improvement in January, the contraction in the ECP market resumed in February, albeit at a more moderate pace, as maturing amounts outpaced new issuance. The asset-backed ECP segment was affected most strongly, with the amounts outstanding almost halving after the finalisation of the December 2008 FSR. In spite of the general decline across issuers, the outstanding volumes of ECP issued by banks stabilised. Their share reached 75% of the total ECP outstanding[3] in March 2009 and remained at that level at the end of May 2009. However, at the end of May the volume of bank-issued ECP was only two-thirds of the volume seen prior to the failure of Lehman Brothers.

In the ECP market, investors demanded high-quality paper and were very discriminating with regard to issuer ratings and sectors, with a preference for shorter-dated securities. Although the share of ECP issued with maturities of less than one month declined from a record 50% in the fourth quarter of 2008, it still accounted for almost 40% in the first quarter of 2009.

Some investors, such as money market funds, kept reducing their commercial paper holdings, including both US commercial paper and ECP. Based on Institutional Money Market Funds Association (IMMFA) data, the share of commercial paper holdings in the investment portfolios of AAA-rated money market funds declined to a record low of 26% in March 2009 and remained broadly unchanged in April 2009. Other investors also remained reluctant to buy short-term bank debt securities, preferring longer-term bank debt securities with more attractive pricing and often also with an explicit government guarantee. In response, affected banks had to resort to other sources of funding.

In summary, despite some signs of improvement, several sources of risk remained in the euro money market. First, with little turnover in longer-term unsecured markets and a preference for short maturities among the main liquidity providers, banks remained reliant on short-term funding in the unsecured market. Second, central bank liquidity facilities

1 Confirming this trend, the volume of outstanding repo transactions conducted in the Euro GC Pooling market, an electronic trading platform managed by Eurex Repo and offering CCP services, rose from €20 billion in January 2008 to €80 billion in April 2009.

2 At the end of April 2009, 52 Italian banks and Italian branches and subsidiaries of foreign banks were participating in the scheme, although participation was open to all EU banks, provided that the respective central banks enter into an agreement with the Banca d'Italia regarding the evaluation and the management of collateral.

3 The total outstanding ECP amounts provided by Dealogic were adjusted to exclude government and supranational issuers.

remained the most important source of liquidity for a number of banks, as indicated by the still large number of bidders in the Eurosystem's refinancing operations. Third, EURIBOR/OIS spreads remained elevated by historical standards and sensitive to adverse developments in broader credit markets and other money markets, in particular in the US dollar money market, given large US dollar liquidity needs by some euro area banks.

## 3.2 KEY DEVELOPMENTS IN CAPITAL MARKETS

### GOVERNMENT BOND MARKETS

After the finalisation of the December 2008 FSR, further adverse changes in the macro-financial environment prompted monetary and fiscal policy measures that have contributed to the steepening of the euro area yield curve.

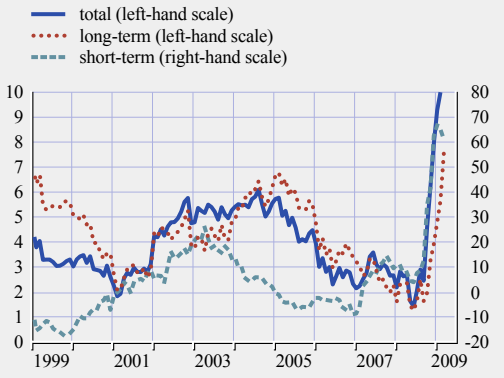
The rise in the term spread of AAA-rated euro area government bonds was mainly driven by the significant declines at the short end of the yield curve (see Chart S73), reflecting policy rate cuts as well as the impact of worsening economic conditions on short to medium-term interest rate expectations. At the long end of the yield curve, AAA-rated ten-year government bond yields in late May 2009 rose to levels above those observed in late November 2008.

Long-term yields already increased temporarily at the beginning of 2009 on account of increased market concerns about the fiscal sustainability risk of some euro area governments stemming from the agreed rescue and economic stimulus packages, as well as from the adverse effects of the deteriorating macroeconomic outlook. Thereafter, a gradual downward revision of sovereign risk since March 2009 has been counterbalanced by the upward pressure on bond yields stemming from the unwinding of previous flight-to-safety flows.

The net issuance of government debt securities increased markedly at the end of 2008 and the beginning of 2009 (see Chart 3.6). New debt issuance was mainly in the form of short-term debt, partly because the steeper yield curve made short-term financing relatively cheaper. In March 2009 short-term debt accounted for more than 12% of the total amount outstanding, the highest share since the introduction of the euro in 1999.

**Chart 3.6 Annual growth of euro area governments' outstanding debt securities**

(Jan. 1999 – Mar. 2009; percentage change per annum)




Source: ECB.

Owing to continued uncertainty in government bond markets and despite a significant decrease from its November 2008 peak, in late May 2009 option-implied volatility remained at relatively elevated levels (see Chart S74).

The national rescue packages for the financial sector announced in October 2008 and thereafter were perceived by investors as a credit risk transfer from the private to the public sector. This induced a one-off effect, with credit default swap (CDS) spreads increasing and corporate financial CDS spreads coming down temporarily. Moreover, it resulted in a reduction in the sensitivity of financial firms' CDS spreads to further crisis-related deteriorations in their financial standing at the price of increased sensitivity of sovereign CDS spreads (see also Box 1 in Section 1.2).

During the first weeks of 2009, the differences in sovereign borrowing costs in the euro area became more pronounced. Investors increasingly discriminated between the debt securities of

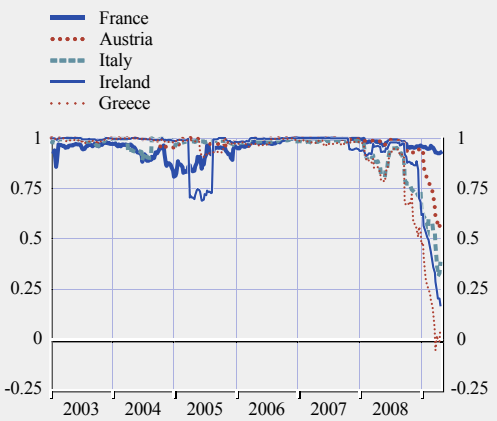
different sovereign issuers by factoring in credit and liquidity considerations as well as hedging and collateralised borrowing possibilities.

This is illustrated by a continued widening of bond spreads relative to Germany and an increasing divergence of CDS spreads at the beginning of 2009. In addition, the correlation between some euro area government bond yields and those of Germany, which was generally strongly positive (close to one) before the onset of the turmoil, became much lower or even turned negative, confirming an increased decoupling of borrowing costs within the euro area government bond markets (see Chart 3.7).

The discrimination between issuers was particularly pronounced vis-à-vis countries that had experienced downgrades of their credit ratings or received credit warnings, countries with high debt levels and large commitments to support the financial sector relative to GDP, or countries where the financial sector was heavily exposed to economic developments in central and eastern European countries. At the same time, a narrowing of CDS and bond spreads since March 2009 indicated an improvement in investors' confidence in sovereign bond markets.

**Chart 3.7 Correlation between weekly changes in German and other euro area government bond yields**

(Jan. 2003 – May 2009; Pearson's correlation coefficient; moving 20-week window)




Sources: Thomson Financial Datastream and ECB calculations.
Note: Correlations between ten-year German Bund yields (weekly changes) and respective euro area equivalents.

Looking ahead, the outlook for euro area government bonds is surrounded by persistent uncertainty regarding macro-financial developments. Upward risks for yields could be seen if flight-to-safety flows unwind further or if bond markets have difficulty in absorbing the increased issuance needs of euro area governments. This risk, however, may be dampened somewhat by the fact that many euro area governments had covered a substantial part of their expected financing needs for 2009 at the beginning of the year.

## CREDIT MARKETS

After the finalisation of the December 2008 FSR, euro area credit markets remained under pressure, although some segments experienced an easing of tension thanks to improving market sentiment and anti-crisis measures by public authorities.

### Debt security issuance

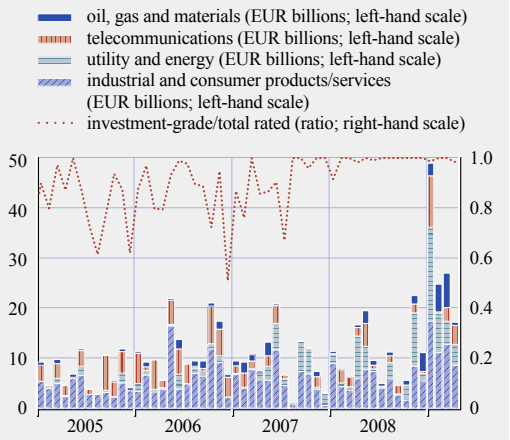
Early 2009 saw a substantial improvement in issuance of, and the demand for, investment-grade corporate bonds. By contrast, the demand for speculative-grade debt has generally remained subdued, with the exception of the marketable debt of some issuers from less cyclical sectors. The bulk of recent debt issues by financial companies has benefited from government guarantees.

As a result, total (gross) euro area non-financial corporate bond issuance rose to a record €103 billion in the first quarter of 2009, almost four times the volume for the first quarter of 2008 (see Chart 3.8), but consisted of predominantly investment-grade debt issues. Investors preferred to buy new issues in the primary market, rather than seasoned credit securities, because bid-ask spreads in the secondary market remained fairly high.

On the issuer side, three main factors boosted primary market activity. First, issuers had to clear a supply backlog after the market freeze in the autumn of 2008. Second, many companies were willing to reduce their dependence on increasingly expensive bank funding. Third, volatile market conditions and concerns about the economic

**Chart 3.8 Corporate bond issuance in the euro area**

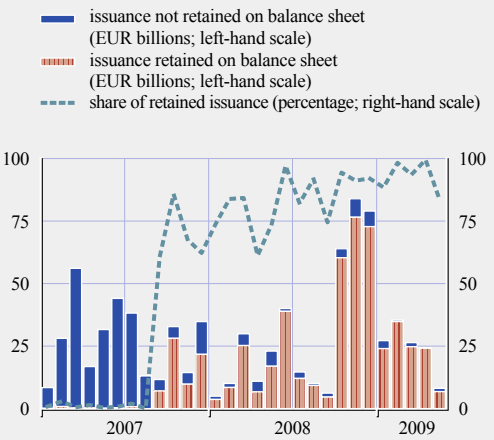
(Jan. 2005 – Apr. 2009)




Sources: Dealogic and ECB calculations.
Note: The investment-grade/total rated ratio is the ratio of the issuance of euro area investment-grade corporate bonds to total rated corporate bonds (euro area investment-grade plus speculative-grade bonds).

**Chart 3.9 Asset-backed security issuance in the euro area**

(Jan. 2007 – May 2009)




Source: Dealogic and ECB calculations.

outlook prompted many issuers to cover some of their future financing needs in advance.

On the investor side, interest in high-quality corporate bonds was supported by attractive yields. In addition, corporate bonds benefited from portfolio reallocation flows owing to the uncertain outlook for equity markets.

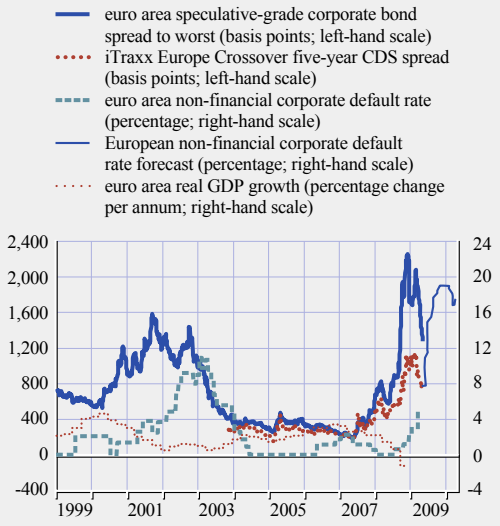
Almost two years after the start of the crisis, in late May 2009 the euro area asset-backed security (ABS) markets remained in a precarious state. Although issuance was taking place, the primary ABS markets were largely dysfunctional because most of the ABS deals continued to be retained on banks' balance sheets and used as collateral in refinancing operations with the Eurosystem (see Chart 3.9). Thus, securitisation continued to be used by banks as a source of liquidity, rather than as a funding instrument, because very few deals were actually placed with third parties.

Volumes traded in the secondary ABS market were a small fraction of their pre-crisis levels. Several factors may explain the subdued activity, including a significant change in investors' appetite for credit risk in view of the deteriorating macroeconomic conditions, uncertainty about valuations of ABS assets and investors' distrust of credit ratings. In combination with the involuntary accumulation of ABSs on banks' balance-sheets following the collapse of off-balance-sheet vehicles, all these factors kept securitisation market activity at very low levels (see also Box 2 on the restoration of securitisation activity in Section 1.2).

A revival of securitisation activity will probably coincide with an economic recovery and will also require both private and public sector initiatives. On account of the unexpectedly rapid deterioration of economic conditions in the euro area, the full recovery of the securitisation market may take some time (see Chart 3.10). Nevertheless, various guarantee programmes that are currently being implemented by euro area governments, which in some respects resemble the TALF and PPIP programmes introduced in the United States, may also prove successful in restarting securitisation activity.

**Chart 3.10 Funding costs and macroeconomic conditions in the euro area**

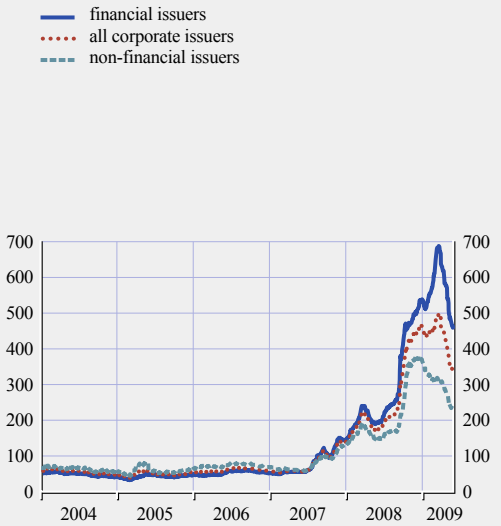
(Jan. 1999 – May 2010)




Sources: Eurostat, JPMorgan Chase & Co. and Moody's.

**Chart 3.11 Average corporate bond spreads for financial and non-financial sector issuers in the euro area**

(Jan. 2004 – May 2009; basis points)




Sources: Merrill Lynch and Bloomberg.
Note: Bonds with maturities of between five and ten years.

Covered bond markets also remained in a dysfunctional state, although the ECB announcement in early May 2009 on the covered bond purchase programme caused some revival of activity and primary issuance picked up. Until then, the primary markets had effectively been closed since autumn 2008 owing to increased risk aversion and competition with government-guaranteed bank bonds, which represented a relatively cheaper source of funding for banks. The issuance volumes during the first quarter of 2009, involving only a few euro area countries, were around 60% of those in 2008.

### Credit spreads

In late May 2009, despite a pick-up in demand from institutional investors, high-grade corporate bond spreads remained very elevated (see Chart S81), reflecting continued high risk aversion and concerns about the worsening economic outlook. Speculative-grade corporate bond spreads, notwithstanding a sharp decrease after the turn of the year, also remained at very high levels (see Chart S82). Both these spreads and the respective CDS premia (see Chart S83) implied that market participants expected a severe deterioration in credit performance, particularly among lower-rated firms. Furthermore, the significant increase in rating downgrades fuelled default fears and contributed to keeping spreads at elevated levels (see Chart S54).

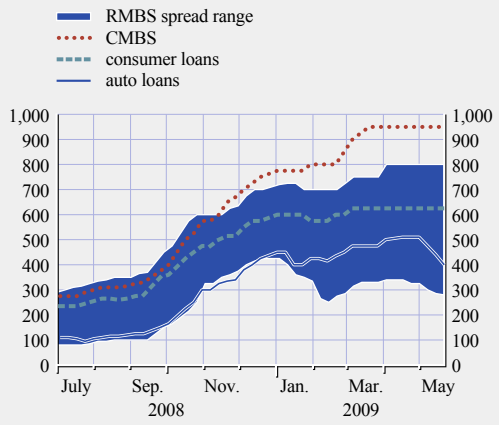
Increased discrimination across sectors resulted in a high dispersion of credit spreads, with CDS and corporate bond spreads much higher in the financial sector and other cyclical industries than in less growth-sensitive sectors (see Chart S85 and Chart 3.11).

Spreads on structured finance products (ABSs and covered bonds) also remained elevated. While retained ABS deals were priced off-market, often to relatively low levels, implied spreads from secondary markets were several times higher (see Chart 3.12). The latter have increased substantially during the last 12 months, despite some tightening at the beginning of 2009 and in May 2009.

In recent months, the overall functioning and liquidity of credit markets has been less than

**Chart 3.12 European asset-backed security spreads in the secondary market**

(July 2008 – May 2009; basis points)




Source: JPMorgan Chase & Co.
Notes: "RMBS" stands for "residential mortgage-backed securities"; "CMBS" 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.

satisfactory. As an illustration, differences between CDS spreads and the asset swap spreads implied by bond prices, also known as the bond-CDS basis, have remained exceptionally wide (see Box 9). This is a clear example of inefficient pricing and could be due to the reduced availability of risk capital and leverage, both of which are typically needed to eliminate such arbitrage opportunities.

In the near term, it cannot be excluded that some credit markets might experience further bouts of forced unwinding, entailing high volatility and abrupt asset price adjustments. In this context, some market participants have expressed concerns about the possibility of a large-scale unwinding of some collateralised loan obligations, as well as of funded and synthetic collateralised debt obligation structures.

Moreover, the credit spreads of most covered bonds, which were less strongly affected in the early stages of the turmoil, have widened significantly amid distressed sales and the uncertainty surrounding possible changes in associated credit rating methodologies. Such changes, if implemented, would result in lower credit ratings and would force rating-constrained investors (for example, insurance companies) to liquidate affected covered bonds. In addition, when deleveraging, banks and other investors preferred to sell covered bonds, rather than ABSs, since the former were more liquid. In order to help to improve market liquidity in this important segment of the private debt security market, in early May the ECB announced its intentions to purchase euro-denominated covered bonds issued in the euro area, which led to some tightening of covered bond spreads.

The outlook for credit markets remains complicated. Should uncertainty about near-term economic recovery prevail, corporate bond and CDS spreads are likely to remain high and volatile, thereby hindering the funding plans of financial and non-financial companies.

**Box 9**

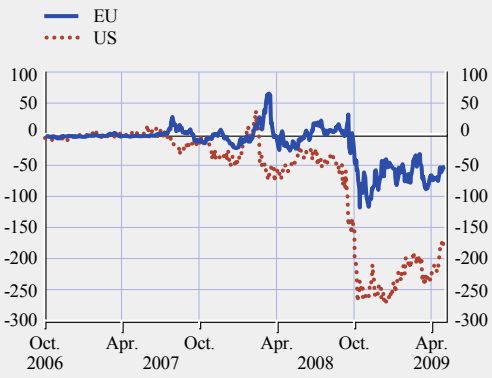
## THE BOND-CDS BASIS AND THE FUNCTIONING OF THE CORPORATE BOND MARKET

Over the few months following the default of Lehman Brothers, conditions in the European corporate bond market deteriorated significantly. This box, after discussing the concept and the main drivers of the bond-CDS basis, examines why this measure may be a good indicator of overall conditions in the corporate bond market. In view of the persistence of the negative basis in the investment-grade segment of the market, the box also discusses the main reasons for the failure of arbitrage and its consequences for the investors that used basis-related investment strategies.

The pricing differential between a CDS spread and an asset swap spread implied by bond prices is called a bond-CDS basis. In normal times the basis tends to be positive and since the relative liquidity of the CDS and bond markets does not change significantly, CDS spread movements tend to lead bond spread movements.[1] However, sudden changes in the conditions in the cash market, mostly owing to a worsening of bond issuance conditions, an increase in funding costs or a larger deterioration in liquidity in the corporate bond market in relation to the CDS market, may cause the basis to suddenly enter negative territory. Thus, since a negative basis tends to be driven by shocks to the cash market, a negative bond-CDS basis may be a good indicator of overall credit conditions in the corporate bond market. In particular, sudden movements of the basis towards negative territory would be an indication of liquidity or funding shocks to the cash market.[2]

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

(Oct. 2006 – May 2009; basis points)




Source: JPMorgan Chase & Co.

The chart shows that the basis abruptly turned negative following the default of Lehman Brothers in mid-September 2008. At that time, the corporate bond market experienced severe stress, whereby issuance conditions deteriorated significantly, funding costs increased markedly, as evidenced by the shift in the average investment-grade bond spread of 100 basis points, and liquidity in the secondary market dried up.

The widening of the difference between asset swap spreads implied by bond prices and CDS spreads encouraged some investors to enter into so-called "basis trades" in order to benefit from the expected convergence of the discrepancy between the prices of bonds and CDSs. There are several basis trade strategies, which are all based on the assumption that the underlying credit risks are similar and that arbitrage in an efficient market should eventually lead to a closing-up of the negative bond-CDS basis.

However, the negative basis in the investment-grade segment of the bond market proved to be persistent, which indicates that arbitrage opportunities could not be exploited by market participants (see Chart). There are several explanations for the persistence of the negative basis. First, an investor may face credit constraints owing to a worsening of funding conditions. Since banks and hedge funds, important potential investors, were under pressure to deleverage, they may have avoided such trades, which imply the use of leverage, whereby the investor borrows funds to buy the corporate bond and simultaneously to buy default protection on the underlying

1 See R. Blanco, S. Brennan and I. W. Marsh, "An empirical analysis of the dynamic relation between investment-grade bonds and credit default swaps", *Journal of Finance,* 60 (5), October 2005.

2 Some recent studies by ECB staff on the relationship between CDS spreads and bond spreads for euro area banks suggest that the outbreak of the financial turmoil in the summer of 2007 induced a substantial increase in risk aversion and a shift in the pricing of credit risk, with CDS markets becoming more sensitive to systematic risk while cash bond markets priced in more information about liquidity and idiosyncratic risk. The long-run relationship between the two spreads holds; however, a significant change in the lead-lag relationship has been identified. For more details, see I. Alexopoulou, M. Andersson, O. M. Georgescu, "An empirical study on the decoupling movements between corporate bond and CDS spreads", *ECB Working Paper*, forthcoming.

bond in the CDS market. Second, there is a non-negligible risk of marking-to-market losses. If the basis shifts further into negative territory after an investor has entered into the basis trade, this implies that unrealised losses from such an investment have to be booked on investors' profit and loss accounts. Since movements in the basis were substantial and volatile, this may have initiated internal stop-losses set by investors. Third, since bonds and CDSs are not perfect substitutes, there may be a minor risk of suffering losses from the trade as a result of the materialisation of risks embedded in one product but not existing in another. In an environment of extreme risk aversion, investors may avoid taking these risks and would not exploit opportunities of such approximate arbitrage. Fourth, low liquidity in one or both markets may boost bid-ask spreads to levels that would make arbitrage opportunities less profitable than they appear.

Market intelligence suggests that the first two reasons were the most significant factors behind the persistence of the basis. Moreover, some banks may have made losses owing to the persistence of the negative basis.

## EQUITY MARKETS

After the publication of the December 2008 FSR, euro area equity markets continued to decline amid worsening economic conditions, high levels of risk aversion (see Charts S75 and S18) and difficulties faced by financial firms, especially banks. However, supported by increased market confidence, stock indices, and bank stocks in particular, rebounded after mid-March 2009. By late May 2009, the broad euro area equity index recovered to the levels recorded in late November 2008.

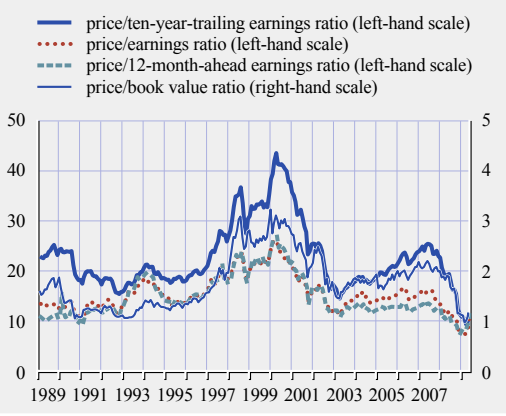
At the beginning of 2009, stock market uncertainty, as measured by the implied volatility derived from stock option prices, increased owing to further downward revisions of economic growth and renewed concerns about the banking sector (see Chart S76). However, in March 2009 implied volatility started to decline and has dropped markedly since then, but it still stood at relatively high levels in late May 2009. Looking ahead, it is unlikely that volatility, which is an important pricing component for many derivatives contracts, including options and CDS contracts, will decline substantially further until concerns about the macro-financial environment start to abate.

Net flows into equity investment funds focusing on euro area equities, despite some improvement, still remained negative in the first quarter of 2009, thereby further extending a prolonged period of such outflows. A reversal of these flows might act as an important stabilising factor for equity prices.

In early 2009 various stock price valuation measures, such as the price/earnings (P/E) ratio based on ten-year-trailing or 12-month-ahead earnings expectations reached their lowest value since the beginning of the series in 1982 and 1987 respectively (see Chart 3.13). Other equity valuation ratios, including the price/cash flow from operations (P/C) and price/book value (P/B) ratios for euro area stocks, tell a similar story. The P/B ratio of all

**Chart 3.13 Equity valuation ratios for the euro area**

(Jan. 1989 – May 2009; ratio)




Sources: Thomson Financial Datastream and ECB calculations.

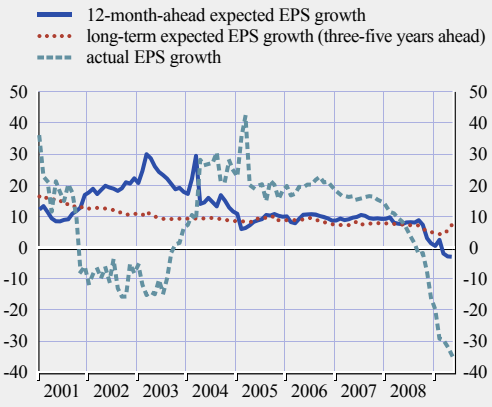
listed companies in the euro area declined to below one in February 2009, and even to around 0.5 for financial firms.

However, actual levels of earnings per share of euro area companies listed in the Dow Jones EURO STOXX index and their expected 12-month growth rates continued to decrease (see Chart 3.14), thereby having a negative effect on investor sentiment. Nevertheless, expected longer-term earnings growth rates started to increase after March 2009, thus suggesting some improvement in investor expectations.

Elevated option-implied equity index volatilities (also over one and two-year periods) suggested persistent uncertainty among investors and expectations that stock prices would remain volatile in the period ahead. While generally low valuation ratios and improved market confidence provided some indication that prices might already have bottomed out, estimates of earnings per share might still surprise on the negative side and turn out to be lower than expected by market participants.

**Chart 3.14 Realised and expected earnings per share (EPS) for the Dow Jones EURO STOXX index**

(Jan. 2001 – May 2009; percentage change per annum)




Sources: Thomson Financial Datastream and ECB calculations.

**Box 10**

## THE IMPACT OF SHORT-SELLING RESTRICTIONS ON EQUITY MARKETS

"Short-selling" refers to the practice of selling shares without owning them, hoping to buy them at a lower price at a later point in time, thus making a profit. If the shares are borrowed, the practice is called "covered" short-selling. "Naked" short-selling is the practice of selling stock without having a lending party, hoping to find one later. Until the current global financial crisis, authorities and academic literature tended to hold the view that short-selling plays a positive role in financial markets in the long run. Short-selling is seen to result in more efficient pricing, to decrease volatility and increase liquidity, and to improve possibilities for hedging and risk management.[1]

In mid-September 2008 regulatory authorities around the world adopted a series of restrictions on the short-selling of financial equity stocks. The common objective of these measures was to restore confidence in the middle of the global financial turmoil. On 18 September 2008 the UK Financial Services Authority (FSA) blocked covered short sales of 34 financial stocks and strictly enforced the requirement that stocks must be borrowed prior to a short sale (preventing naked short-selling) . In addition, to increase transparency, the FSA introduced rules requiring the disclosure of short positions that exceeded a certain threshold of a company's stock. The US Securities and Exchange Commission (SEC) adopted similar measures and blocked the

1 See E. M. Miller, "Risk, Uncertainty, and Divergence of Opinion", *Journal of Finance*, 32 (4), 1977; and R. Jarrow, "Heterogeneous Expectations, Restrictions on Short Sales, and Equilibrium Asset Prices", *Journal of Finance*, 35 (5), 1980.

temporarily covered short sales of 799 financial stocks on the following day.[2] Following the SEC and the FSA, European regulators introduced rules prohibiting mainly the naked short-selling of financial shares.[3]

Some evidence of a resulting decline in market efficiency for the affected stocks in the United Kingdom and the United States has been documented. For the US stock market, Bris documented the fact that market quality and stock liquidity declined as investors found it increasingly difficult to hedge market risks.[4] For the UK stock market, Clifton and Snape noted that bid-ask spreads increased significantly for the banned financial equity stocks and registered a dramatic decline in volume and turnover.[5] For the German stock market, this box examines how the short-selling restrictions introduced by the BaFin, the federal financial supervisory authority, on 22 September 2008 affected the behaviour of stock prices of financial companies.[6] Specifically, the BaFin prohibited naked short-selling transactions in specified shares of 11 financial companies.

Investors can replicate the price behaviour of stocks in the options markets by simultaneously taking long and short positions in puts and calls and lending cash. This box assesses whether the prices of these synthetic stocks were lower where restrictions on short sales made it difficult or expensive to short-sell the stock itself.[7] The analysis focuses on tick data trades for 11 major European financial companies traded on the Deutsche Börse over the period from July 2007 to November 2008. The dataset includes four of the 11 financial companies subject to the BaFin's restriction.[8] Using short-term at-the-money call and put options with the same strike and expiration, 24,846 sets of trades were selected to generate synthetic stock prices. The sample is split on 22 September 2008, when restrictions on naked short-selling were introduced, creating a pre-event and a post-event sample. 22,354 sets of trades are contained in the pre-event sample and 2,492 in the post-event sample. Attention is restricted to cases that seem to promise profits: the number of times the stock price is higher (lower) than the synthetic price by more than 2% is counted. As expected, in the large majority of cases, there are no arbitrage opportunities. There are (i) 740 pre-event cases and 29 post-event cases in which it appears that an investor could buy synthetically in the options market and sell at a higher price in the stock market (Category 1); and (ii) 33 pre-event cases and 17 post-event cases in which it appears that investors could buy in the stock market and sell synthetically at a higher price in the options market (Category 2). The number of apparent arbitrage opportunities of Category 1 is higher than that of Category 2. One explanation why arbitrage opportunities of both categories could not be exploited could be that it was impossible or too expensive in these specific cases to sell the stock. However, a substantial

2 The SEC ban expired on 2 October 2008 and the FSA ban on 16 January 2009.
3 Moreover, most European regulators made it obligatory for financial institutions to abstain from lending the shares concerned, therefore prohibiting covered short sales, except where this is needed to cover an existing position, perform an obligation contracted prior to the coming into force of the rule or where a transaction has no link with a short economic position.
4 See A. Bris, "Shorting Financial Stocks Should Resume", *Wall Street Journal*, 29 September 2008.
5 See M .Clifton and M. Snape, "The Effect of Short-selling Restrictions on Liquidity: Evidence form the London Stock Exchange", *London Stock Exchange Policy Note*, 19 December 2008.
6 On 30 March 2009 the BaFin extended its ban on certain short-selling transactions to 31 May 2009.
7 In the literature, the same type of analysis was conducted to examine whether difficulties in short-selling internet stocks during the growth of internet stock prices over the period 1998-2000 meant that the prices of such stocks reflected the beliefs of optimistic investors only. See R. Battalio and P. Schultz, "Options and the Bubble", *Journal of Finance*, 61, 2006; E. Ofek and M. Richardson, "DotCom Mania: The Rise and Fall of Internet Stock Prices", *Journal of Finance*, 58, 2003; E. Ofek, M. Richardson and R. Whitelaw, "Limited Arbitrage and Short Sales Restrictions: Evidence from the Options Market", *Journal of Financial Economics*, 74, 2004; and O. Lamont and R. Thaler, "Can the Market Add and Subtract? Mispricing in Tech Stock Carve-outs", *Journal of Political Economy*, 111, 2003.
8 Specifically, the four financial companies are Commerzbank, Deutsche Bank, Deutsche Postbank and Hypo Real Estate Holding. The other financial companies are BNP Paribas, Credit Suisse, Credite Agricole, Fortis, UBS, Unicredito Italiano and Société Générale.

proportion of these opportunities belong to the pre-event sample. Finally, the analysis reveals that the introduction of restrictions on naked short-selling did not affect the stock and option prices of the financial companies subject to the ban with respect to the pre-event sample.

Conclusions on the impact of short-selling restrictions on the market are mixed. In fact, adverse consequences for liquidity in a given bank stock and its derivatives were minimal in the German market, but severe in the markets in the United States and the United Kingdom. A plausible explanation is that the different types of restriction introduced by financial authorities affected market efficiency to different degrees. In Germany, a ban on naked short-selling of specific financial stocks was introduced, while covered short-selling was prohibited in the United Kingdom and the United States. Prohibiting naked short-selling may make the practice of short-selling more costly, but it is generally a less severe restriction than prohibiting covered short-selling. In fact, a ban on naked short-selling does not exclude the participation of potential sellers, who may have bearish views on a stock. This restriction does not reduce transactions in the stock market, which in turn does not delay price discovery and curtail liquidity.

## 4 THE EURO AREA BANKING SECTOR

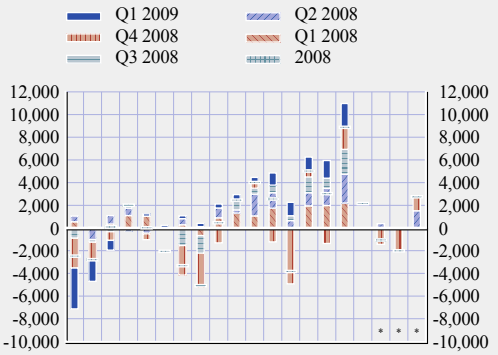
*Euro area banks came under intense financial stress in the last quarter of 2008, and many large and complex banking groups (LCBGs) suffered substantial losses. While these losses were partly due to further write-downs on their structured product portfolios, the deterioration of the macroeconomic environment in the first quarter of 2009 had a more marked impact, triggering an increase in loan losses and a decline in non-interest revenue. Market participants also became increasingly attentive to the level of capital ratios, which held up well, thanks partly to government recapitalisations and especially to the quality and composition of capital. The overall outlook for LCBGs remains uncertain, with the prospective increase in loan losses affecting most of these institutions and funding costs remaining elevated beyond very short-term maturities. In this regard, and notwithstanding some improvement in financial positions in the first quarter of 2009, euro area LCBGs will have to take further steps to convince financial markets and authorities that they will be in a position to withstand the risks that lie ahead. More elaborate pricing of loans and hedging of securities, as well as further cost-cutting and rethinking of business models, might be necessary to restore stable earnings and organic capital growth.*

### 4.1 FINANCIAL CONDITION OF LARGE AND COMPLEX BANKING GROUPS [1]

Stresses in the euro area banking system remained intense in the last quarter of 2008 and in the first quarter of 2009. Most banks reported either substantial profit declines or outright losses for 2008. Much of the profit compression was reported for the fourth quarter of 2008. The weighted average return on shareholder equity (ROE) for 2008 as a whole declined dramatically, to 1.9%, from 11.7% in 2007, for the full sample of 20 LCBGs.[2] In fact, the whole ROE distribution across LCBGs continued to shift downwards in 2008, as compared with 2007 and 2006 (see Chart S86). The erosion of bank profits is attributable to a number of factors.

**Chart 4.1 Quarterly pattern of the net income of euro area large and complex banking groups in 2008 and the first quarter of 2009**

(EUR millions)




Sources: Individual institutions' financial reports and ECB calculations.
Note: *: A small number of LCBGs report only semi-annually.

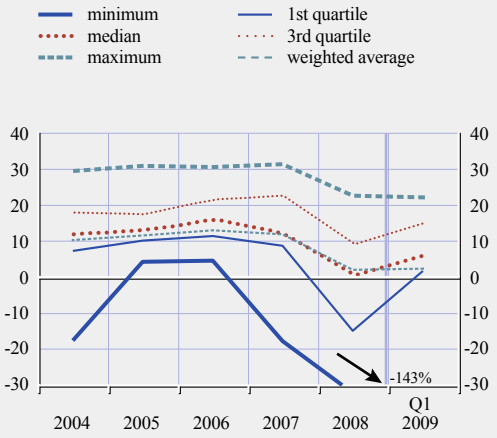
Write-downs on structured products continued, and the deterioration of the macroeconomic environment triggered a rise in loan loss provisions. In the fourth quarter alone, write-downs on structured assets at euro area LCBGs amounted to €29.7 billion, the highest quarterly figure so far. For 2008 as a whole, the amount was €70.6 billion. The weighted average loan impairment charges of euro area LCBGs was 0.21% of total assets in 2008, compared with 0.08% in 2007 (see Table S5). At the same time, the unfavourable trading environment, especially in the last quarter of 2008, squeezed net non-interest revenues. As a percentage of total assets, these fell from 0.94% in 2007 to 0.48% in 2008 (see Table S5).

Over the course of 2008, the annualised quarterly ROE (using shareholders' equity as a measure of equity) of euro area LCBGs declined quarter after quarter, from 12.1% in the first quarter to 9.1% in the second, and to 1.6% and -18.7% in the third and fourth quarters respectively, but recovered in the first quarter of 2009, to 2.2%. Reported performance in the last quarter of the

1 The analysis of developments in the first quarter of 2009 in this section is based on data for a sub-set of LCBGs that had reported at the time of finalisation of the Financial Stability Review (FSR).
2 Two banks were dropped, owing to acquisition activity and a split of the company, from the sample of LCBGs which is the focus of this chapter. The identification of LCBGs is described in Box 10 in ECB, *Financial Stability Review*, December 2007.

**Chart 4.2 Return on equity of euro area large and complex banking groups**

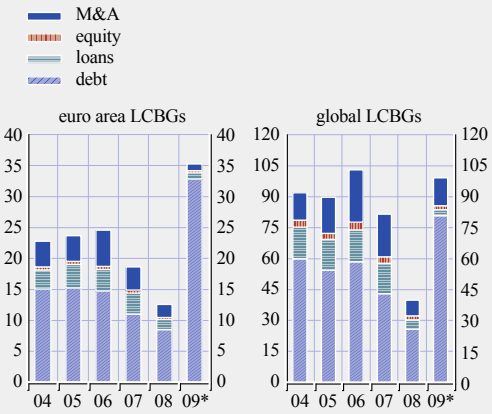
(2004 – Q1 2009; percentage)




Sources: Individual institutions' financial reports and ECB calculations.
Note: The chart uses Tier 1 capital as a measure of equity capital. Data for Q1 2009 are for a subset of 16 LCBGs that reported quarterly results in the first quarter of 2009.

**Chart 4.3 Capital market underwriting volumes of euro area and global large and complex banking groups**

(2004 – Apr. 2009; percentage of assets)




Sources: Dealogic and ECB calculations.
Note: Figures for 2009 cover the period from January to May.

year was especially weak (see Chart 4.1). Part of the steady decline in the financial performance of LCBGs is probably due to the above-cited factors and the intensification of the market turmoil after the failure of Lehman Brothers. However, the fact that performance deteriorated so significantly during the last quarter, and by much more than analysts and market participants had expected, raises questions about the transparency of quarterly earnings reports, which are not audited. The pattern of reported profit erosion could, for instance, indicate that banks with outsized fourth-quarter losses had attempted to smooth earnings throughout the year, assuming that the worst of the crisis would be over by end-2008. This might also explain the further substantial declines in many bank stock prices and persistently elevated credit default swap (CDS) spreads in the last quarter of 2008 and early 2009 (see Section 4.3).

In the first quarter of 2009, the performance of euro area LCBGs improved somewhat in comparison with that in 2008 as a whole, although there were a few significant underperformers that pulled down the average performance ratios. For a subset of 16 LCBGs that report on time and in sufficient detail, the weighted average ROE (using Tier 1 capital as a meaure of equity) fell from 4.05% in 2008 to 2.13% in the first quarter of 2009 (see Chart 4.2). This figure was negatively influenced, however, by severe losses at very few LCBGs, reflecting a large increase in loan losses and writedowns on structured asset portfolios (and on exposures to monolines in particular cases), as well as exceptional losses. Excluding the most negative observation, the ROE in fact improved modestly to 6% in the first quarter of 2009.

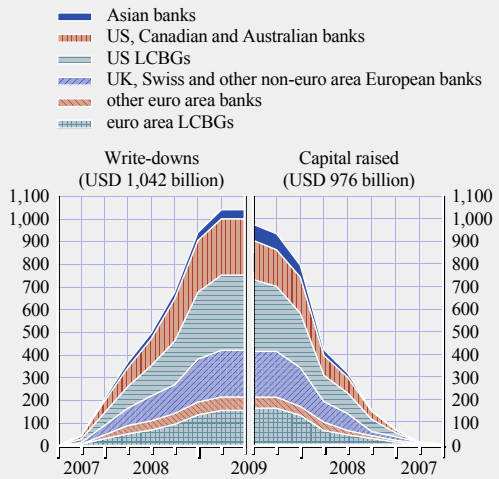
Underpinning the tentative recovery in financial performance by most LCBGs were strong revenues from retail lending (thanks to a steeper yield curve), fee income (from mergers and acquisitions, and capital market advisory business) and substantial cost cutting, all of which helped to underpin profitability. Notably strong capital market issuance volume (thanks to a low interest rate environment and issuance by investment-grade corporates) greatly supported both euro area and global LCBGs' non-interest income in the first quarter (see Chart 4.3). Whether this proves sustainable for the rest of 2009

will very much depend on banks' ability to keep up their performance and contain write-downs while, at the same time, achieving further progress in de-risking their balance sheets. For instance, interest revenue could well be boosted for banks in countries where "fixed-rate" lending is predominant (see Box 13). Similarly, issuance activity could remain high for some time to come as (mainly large) corporates continue to tap the capital markets.

According to estimates as at 28 May 2008, the total reduction in net income attributable to write-downs by global banks since the turmoil erupted has amounted to USD 1,042 billion (see Chart 4.4). US, Canadian and Australian banks reported the bulk of the income losses – about 56% of the overall figure. A further 20% was suffered by UK, Swiss and other non-euro area European banks, and another 20% by euro area banks.[3] For euro area LCBGs, write-downs amounted to USD 20 billion in the first quarter of 2009. For 2008 as a whole, write-downs for euro area LCBGs amounted to USD 105 billion. There is little evidence, therefore, to suggest that the pace of write-downs has abated.

**Chart 4.4 Turmoil-related bank write-downs and capital raised by region**

(as at 28 May 2009; USD billions)




Sources: Bloomberg and ECB calculations.
Note: The data do not cover all banks in the euro area nor do they cover all banks across the globe.

It is important to note that there were also factors which supported euro area banks' financial results in the second half of 2008. In particular, the reclassification of assets from trading and available-for-sale to hold-to-maturity in the third and fourth quarters of 2008, which was also done by Swiss and UK banks, delayed the negative impact of markdowns on profit and loss accounts. Without this, reported financial performances would have been considerably weaker in the last two quarters of 2008. An inspection of individual bank statements suggests that euro area LCBGs reclassified €375 billion of assets. The additional reduction in income before taxes without reclassification would have amounted to €11.2 billion (which compares with aggregate profits of €18.3 billion for 2008 as a whole). Euro area LCBGs also indicated that without reclassification, equity would have fallen by €14.1 billion (around 3% of their equity base).

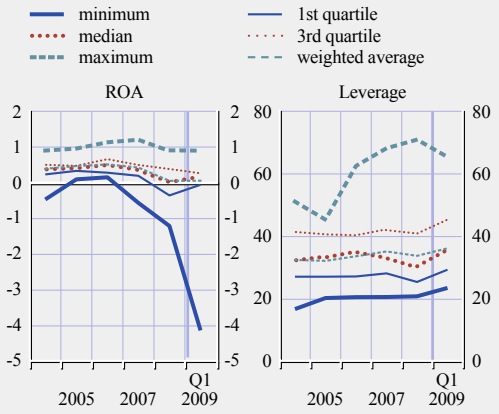
This having been said, further strains on profits cannot be excluded, as pressures on income remain high and write-downs are not expected to abate soon (see also Section 4.2). This in turn is likely to put additional pressure on banks' capital buffers. Seeing the ROE profitability measure as the product of the return on assets (ROA) and the asset-to-equity ratio (a measure of leverage), it is possible to decompose patterns in the ROE of euro area LCBGs (see Chart 4.5). Underlying the declines of the ROE during 2008 was a significant drop in intrinsic profitability: the average ROA declined from 0.41% in 2007 to just 0.01% in 2008. At the same time, active attempts by banks to deleverage also placed downward pressure on the ROE, as the weighted average leverage multiple decreased from 37 in 2007 to 33 in 2008.[4] For the first quarter of 2009, the weighted

3 Box 14 in Section 4.2 discusses the outlook for euro area LCBGs' future financial losses.

4 For the six LCBGs where the leverage multiple effectively increased, this can be attributed to a combination of realised net losses and reductions in unrealised gains on available-for-sale securities (both reducing equity) and the increase in the replacement value of derivatives (increasing both assets and liabilities) following official interest rate cuts, stock index declines and credit spread widening in the last quarter of 2008.

**Chart 4.5 Return on assets and leverage of euro area large and complex banking groups**

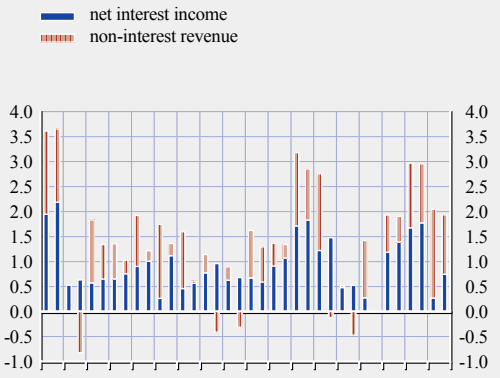
(2004 – Q1 2009)




Sources: Individual institutions' financial reports and ECB calculations.
Notes: Leverage is defined as assets-to-Tier 1 capital. Data for Q1 2009 are for a subset of 16 LCBGs that reported quarterly results in the first quarter of 2009.

**Chart 4.6 Evolution of interest and non-interest revenue of individual euro area large and complex banking groups**

(2007-2008; percentage of total assets)




Sources: Individual institutions' financial reports and ECB calculations.

average ROA of the 16 LCBGs for which quarterly figures are available remained broadly unchanged at 0.07% compared with 0.06% in 2008. Again, when excluding the minimum observation, it actually improved to 0.18%. Leverage, on the other hand, seemed to have slightly increased from 34.2 to 35.4, suggesting that the process of deleveraging may have stalled or even reversed somewhat. In all likelihood, further strains on profits and pressures to deleverage and de-risk will remain in place for a prolonged period of time. This may mean that euro area LCBGs will experience a prolonged period of lower profitability.

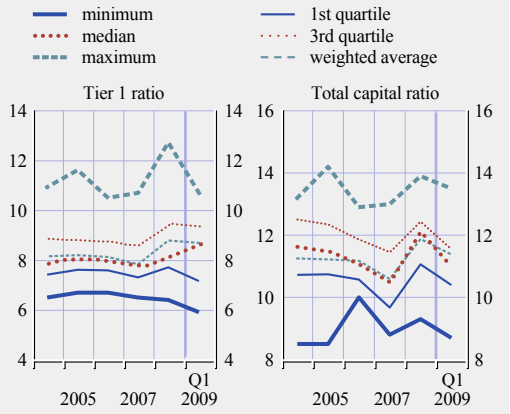
Price-to-book ratios also reflect the low profitability of banks (see also Section 4.3). Since the start of the financial crisis in 2007, price-to-book ratios in the US and euro area banking sectors have fallen continuously and are now significantly below one, implying that market participants consider banks to be worth less than their intrinsic values, arguably because markets discount further losses. It should also be noted that these implied losses have come down markedly since the beginning of March, thanks to an improvement in price-to-book ratios.

Looking at the composition of euro area LCBGs' revenue in more detail, it is clear that mainly non-interest revenue suffered in 2008 (see Chart 4.6). Net interest revenue stabilised at around €140 billion and, expressed as a percentage of total assets, it actually increased from 0.85% in 2007 to 1.02% in 2008 (see Table S5). Net non-interest revenue, on the other hand, fell sharply from around €170 billion in 2007 to €110 billion in 2008. Banks' trading income was the main item to suffer on account of adverse market conditions throughout the year and especially in the fourth quarter. As a percentage of total assets, income from trading declined from 0.30% in 2007 to -0.08% in 2008. Fee and commission income held up relatively well throughout 2008, declining modestly from 0.57% in 2007 to 0.48% of total assets in 2008, while other income also fell from 0.15% to 0.05% of total assets.

Turning to capital adequacy, euro area LCBGs' current regulatory capital ratios are in conformity with the regulatory minimum requirements. Moreover, both the median and weighted average Tier 1 ratios increased in 2008, as compared with 2007, from 7.76% to 8.15% and from 7.83% to 8.77% respectively (see Chart 4.7). In the first quarter of 2009, the Tier 1 capital ratio for the

**Chart 4.7 Tier 1 capital and overall solvency ratios of euro area large and complex banking groups**

(2004 – Q1 2009; percentage)




Sources: Individual institutions' financial reports and ECB calculations.
Note: Data for Q1 2009 are for a subset of 16 LCBGs that reported quarterly results in the first quarter of 2009.

subset of 16 LCBGs that reported quarterly figures remained unchanged from 2008 at 8.4%. The total capital ratio followed more or less the same pattern. Part of the recovery in regulatory capital is due to a reduction in risk-weighted assets and asset shedding at a majority of LCBGs. However, the increase also reflects the fact that euro area LCBGs successfully raised capital in 2008 – both from private and from public sources – to cover the losses incurred. As shown in Chart 4.4, by the cut-off date of this FSR, euro area banks had received relatively more fresh capital than their US peers, as private and public capital injections were equivalent to 138.3% of write-downs in the euro area versus 89.2% in the United States.

By the cut-off date for this FSR, euro area LCBGs had announced €64 billion of capital injections from governments, in addition to €113 billion funding guarantees, following the intensification of the financial crisis in September-October 2008 (see Box 11 for details of the various support measures and their effectiveness as seen against the stated objectives). However, questions have been raised among market participants as to whether this additional capital raising represents true deleveraging. This is because capital injections by governments have taken place mainly through the issuance of preference shares, representing around 43% of their total capital increase for some euro area LCBGs. Although these efforts have helped the banks in question to improve their regulatory capital ratios, this form of capital does not have the same loss-absorbing features as common equity.

**Box 11**

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

This box summarises the measures taken by euro area governments to support the banking sector and discusses their implementation and effectiveness.

Following the bankruptcy of Lehman Brothers in September 2008, financial market stress intensified sharply. After the summit of the EU Heads of State or Government in Paris in October 2008, EU governments implemented support measures to alleviate strains on their banking systems. These measures complement the extensive liquidity support that has been provided by the ECB and have been implemented in accordance with specific guidance from ECB and the European Commission.[1]

1 The recommendations can be downloaded from the following websites: http://www.ecb.int/pub/pdf/other/recommendations_on_guaranteesen.pdf (Recommendations of the Governing Council of the European Central Bank on government guarantees for bank debt), www.ecb.int/pub/pdf/other/recommendations_on_pricing_for_recapitalisationsen.pdf (Recommendations of the Governing Council of the European Central Bank on the pricing of recapitalisations), and http://www.ecb.int/pub/pdf/other/guidingprinciplesbankassetsupportschemesen.pdf (Eurosystem guiding principles for bank asset support schemes).

The main objectives of the public support schemes are to (i) safeguard financial stability; (ii) restore the provision of credit and lending to the economy; (iii) promote a timely return to normal market conditions; (iv) restore the long-term viability of the banking sector; and (v) contain the impact on public finances and preserve taxpayers' interests. In practice, the government support schemes introduced thus far fall into one of three main categories: (i) guarantees for bank liabilities; (ii) re-capitalisation measures; and (iii) measures to provide relief from legacy assets. The main characteristics of these schemes, most of which have been made available to banks on a voluntary basis, can be summarised as follows.[2]

- *Guarantees for bank liabilities*. In accordance with the agreement reached at the Paris summit, euro area governments raised the coverage of their deposit insurance schemes to the new maximum of €50,000 per deposit account, with some governments extending the guarantees even further. In addition, many countries started to extend government guarantees to cover newly issued bank debt securities. These guarantees were provided either on an ad hoc basis or within national schemes, with pre-announced commitments of the total amounts made available for banks.

- *Capital injections*. Several governments also provided Tier 1 capital to banks. Capital injections have mostly been made through the acquisition of preference shares or other hybrid instruments which fulfil the conditions for Tier 1 capital. Some countries have considered the provision of capital through the acquisition of ordinary shares.

- *Asset support schemes*. Some countries have set up asset support schemes. These can take the form of asset removal schemes (transferring the assets to a separate institution) or asset insurance schemes (keeping the assets on the banks' balance sheets). Some initiatives can be categorised as hybrid schemes, in that they involve asset transfers, financed through guaranteed public sector loans, and sophisticated risk-sharing arrangements between the governments and the participating banks.

A summary of the measures is given in the table below. The numbers outside parenthesis show the volume of the schemes as implemented by the cut-off date of this FSR, while the numbers in parenthesis show the full amounts to which governments have committed. Regarding the implementation of these measures, some conclusions can already be drawn. The take-up rate is generally low across

2 This is in contrast to some of the schemes announced in the United States where, for example, the recapitalisation measures have more often been compulsory.

**Summary of rescue measures in Europe**

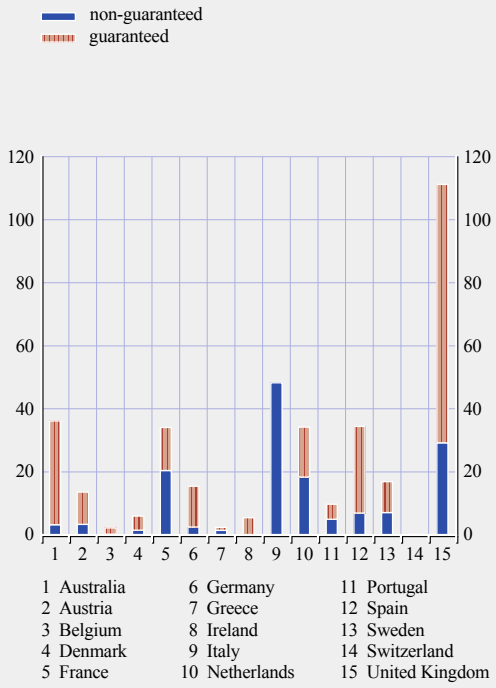
(EUR billions unless stated otherwise)

| | Capital injections | | Liability guarantees | | Asset support | | Total commitment |
|---|---|---|---|---|---|---|---|
| | Within schemes | Outside schemes | Guaranteed issuance of bonds | Other guarantees, loans | Within schemes | Outside schemes | as % GDP |
| Europe | 103.4 (251) | 56.6 | 543.7 (2,136) | 236.8 (-) | 585.4 (877) | 26.2 | 27.3 |
| EU | 99.4 (247) | 56.6 | 543.7 (2,096) | 236.8 (-) | 544.2 (836) | 26.2 | 27.9 |
| Euro area | 59.1 (172) | 54.1 | 396.8 (1,677) | 235 (-) | 23.7 (198) | 26.2 | 23.7 |

Sources: National authorities, Bloomberg and ECB calculations.
Notes: Data are cumulative since October 2008. Numbers 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.

**Chart A Cumulative volume of gross issuance of bank bonds in Europe**

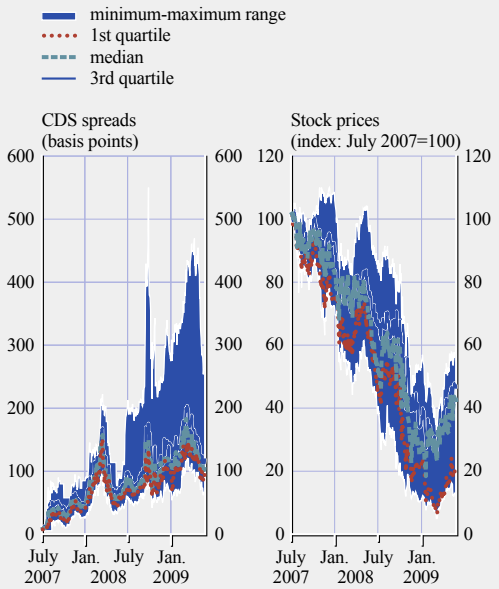
(Oct. 2008 – May 2009; EUR billions)




Sources: Dealogic and ECB calculations.

**Chart B Distribution of five-year senior CDS spreads and stock prices for euro area large and complex banking groups**

(July 2007 – May 2009)




Sources: Thomson Financial Datastream and ECB calculations.

all measures, but there are substantial variations: the use of recapitalisation measures has been relatively widespread, while the issuance of bank bonds with government guarantees has been considerably lower, albeit with an increasing take-up rate over the last few months.

However, as the issuance of non-guaranteed bank bonds remains limited in most countries, the use of guaranteed bonds is likely to have been indispensable in providing banks with access to medium-term funding when needed (Chart A). Reasons for the slow take-up rate include the occasionally relatively high liquidity premium on guaranteed bank debt over government debt, possible stigma effects (i.e. resorting to government assistance may be perceived as a signal of bank weakness), conditions that are sometimes attached to such guarantees (such as restrictions on remuneration), decreased medium-term funding needs owing to ongoing deleveraging by banks, and the general slowdown in demand for credit. Overall, while it is clear that the measures were successful in averting a further escalation of the crisis in late 2008, in spite of recent improvements, investor sentiment towards the banking sector remains rather negative, as evidenced by the still elevated levels of interbank money market spreads and banks' CDS spreads, as well as low (albeit rising recently) bank stock prices (Chart B).

The various measures to support the financial sector are expected to have only a small direct impact on government deficits in the short to medium term. The impact on government debt largely depends on the borrowing requirements of the government to finance the rescue operations. However, potential fiscal risks are sizeable for all countries that have established a guarantee scheme as it may negatively affect market perceptions' about the creditworthiness of the respective governments.

The impact of the measures on the provision of credit to the non-financial sector is more complex to assess, especially when it comes to separating possible credit supply restrictions from the observed decline in demand for loans. At the current juncture, credit to the private sector continues to be on a downward trend: year-on-year credit growth has decreased further, and monthly flows have even become negative in the first quarter of 2009. Banks that have tightened their lending standards have done so mostly in reaction to the deteriorating economic outlook, but also in response to continued funding pressures, notwithstanding the government support, hence indicating that some loan supply constraints cannot be ruled out at present.

In effect, banks have come under increased scrutiny by shareholders and market participants over capital adequacy and some face intense pressure to deleverage.[5] The increase in Tier 1 and total capital ratios suggests that such processes are indeed ongoing, and many banks have indicated that the trend is likely to continue throughout 2009.

Some additional indirect evidence on deleveraging can be gained by analysing how the stock prices of euro area banks have moved with the market. The beta coefficient – a measure of co-movement of an individual stock with the rest of the market and an indicator of the scale of systematic risk – has fallen since the demise of Lehman Brothers in September 2008.[6] More recently, however, the beta coefficients have again increased to historical highs, possibly reflecting positive earnings revisions (see Chart 4.8). A similar pattern is visible for US banks, whose sensitivity to market-wide shocks has been higher and has risen by more than that of euro area banks since the start of the financial crisis in mid-2007.

In addition, an important consideration at present is the quality and composition of capital, with an increased emphasis on core Tier 1 capital – the most permanent and stable source of capital – and various leverage ratios, such as tangible equity to assets or gross leverage (as in Chart 4.5).[7] In this regard, a threshold figure for Tier 1 often quoted by market participants is 10%. The shift in bank capital structures can be attributed to the downgrading of the lesser forms of regulatory capital (in line with deliberations of the Basel Committee) and is already having a profound impact in both the cash and CDS markets.[8] Box 12 analyses the changes in the composition of banks' capital in more detail.

**Chart 4.8 Beta coefficients of euro area and US banks' stock prices**

(June 1999 – May 2009)


Sources: Thomson Financial Datastream and ECB calculations.
Note: Beta coefficients are estimated from rolling 120-day regressions of $Ra = + R_w$, where $R$ denotes the bank sector return in the euro area and the United States, and $R_w$ the world market return.

5 See, for example, Barclays Capital, "Tier 1/Upper Tier 2 into High Yield", March 2009.

6 There is a positive relationship between beta, as obtained from the Sharpe-Lintner capital asset pricing model (CAPM), and leverage: $\beta_{CAPM} = \beta_U [1+(1-t)D/E]$, where $\beta_{CAPM}$ denotes the CAPM beta, $\beta_U$ the unlevered beta, t the corporate tax rate, and D/E the firm's leverage ratio.

7 The arguments in favour of targeting simple leverage ratios are two-fold. First, assets which are believed to be low risk (because highly liquid) can become highly illiquid and risky when systemic problems emerge. Second, calculating capital requirements on the basis of internal models entails judgement. See also the UK Financial Services Authority, "Turner Review: A Regulatory Response to the Global Financial Crisis", March 2009.

8 JPMorgan Chase & Co., "Thoughts on European Bank Capital", April 2009. It is now expected that there will be no new issuance of dated subordinated debt instruments (lower Tier 2), and the absence of deliverables is causing the longer end of the subordinated CDS curve to invert and converge toward senior CDS levels. In cash markets, the shift in bank capital explains why issuers face less resistance in redeeming callable structures.

Box 12

## THE COMPOSITION AND QUALITY OF BANK CAPITAL

Following the intensification of the financial crisis in late 2008, euro area banks have come under increased pressure to improve the size and quality of their capital buffers. This box examines the capital positions for a sub-sample of 15 euro area LCBGs that had reported in enough detail to provide figures for both 2007 and 2008.

The total amount of regulatory capital decreased slightly, by 4%, over the period 2007-08 for the sample of 15 euro area LCBGs (see the table below). However, more noteworthy are the important changes in the composition of capital. Tier 1 and core Tier 1 capital increased modestly, while supplementary capital fell by 28%. Especially upper Tier 2 and Tier 3 capital were reduced significantly. This may well reflect the fact that banks have made efforts to respond to the pressure from market participants to achieve a higher quality of capital, as well as to changing priorities (in the medium run) in terms of bank solvency metrics on the part of regulators.[1]

The sample of 15 LCBGs also reduced the size of their risk-weighted asset portfolio, by 13%, over the period 2007-08, while total assets remained virtually unchanged. The former may be largely due to the introduction of Basel 2 in 2008. In any case, the combined impact of asset rebalancing and a reshuffling in capital led to substantial improvements in regulatory capital ratios, with Tier 1 reaching almost double the regulatory minimum for these banks. On the other

1 See, for example, UK Financial Services Authority, "The Turner Review", March 2009, which advocates that regulatory capital ratios be expressed entirely in terms of high-quality capital – broadly speaking the current core Tier 1 and Tier 1 definitions.

### The composition of euro area large and complex baking groups' capital

(EUR millions; in percentages)

| | 2007 | 2008 | Percentage change |
|---|---|---|---|
| **Volumes** | | | |
| Core Tier 1 capital | 280,664 | 288,921 | 3.0 |
| Total hybrid capital | 59,078 | 77,912 | 32.0 |
| *As a percentage of Tier 1* | *17* | *22* | |
| of which innovative hybrid capital | 7,865 | 1,652 | -79.0 |
| *As a percentage of Tier 1* | *2* | *0.5* | |
| Tier 1 capital | 340,611 | 360,757 | 6.0 |
| Lower Tier 2 capital | 154,532 | 124,685 | -19.0 |
| Upper Tier 2 capital | 23,356 | 1,587 | -93.0 |
| Tier 3 capital | 3,774 | 1,451 | -62.0 |
| Supplementary capital | 189,412 | 136,278 | -28.0 |
| Total regulatory capital | 479,897 | 461,898 | -4.0 |
| Total risk-weighted assets | 4,643,836 | 4,039,954 | -13.0 |
| Consolidated total assets | 13,096,303 | 13,064,708 | -0.2 |
| Tangible assets | 12,953,667 | 12,928,106 | -0.2 |
| Consolidated equity (including minorities) | 499,484 | 410,903 | -18.0 |
| **Ratios** | | | |
| Core Tier 1 capital ratio | 6.04 | 7.2 | 18.0 |
| Tier 1 capital ratio | 7.33 | 8.9 | 22.0 |
| Total capital ratio | 10.33 | 11.4 | 11.0 |
| Equity/assets | 3.81 | 3.1 | -18.0 |
| Core Tier 1 capital/tangible assets | 2.17 | 2.2 | 3.0 |

Sources: CreditSights and ECB calculations.
Note: The sample refers to 15 euro area LCBGs with comparable data for 2007 and 2008.

hand, the leverage ratio fell from 3.81% to 3.10%, owing to the sharp decline in consolidated equity as a result of the effect of negative earnings.

As equity capital has been depleted during the crisis, investors have been demanding a higher quality and quantity of bank capital. Though banks still have ample Tier 1 capital to meet regulatory requirements, they may need additional equity capital to satisfy the increasing capital requirements of investors. Market participants currently often refer to a threshold Tier 1 ratio of 10% and a leverage ratio of 4-5%.

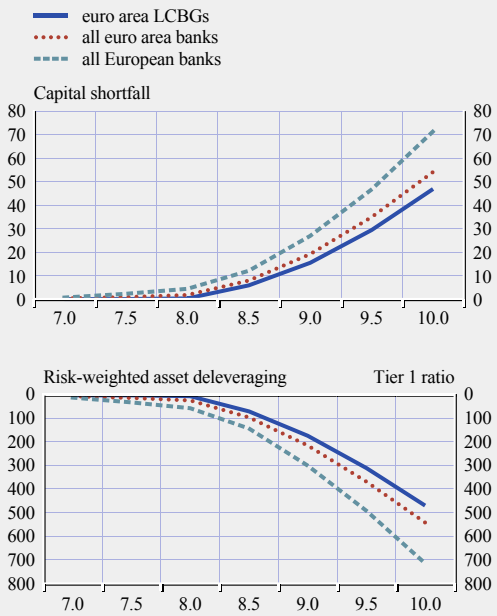
Simulations show that in order to meet a Tier 1 ratio of 10%, €47 billion in additional capital would be required for a group of 16 euro area LCBGs, and €71 billion for a larger sample of 35 European banks including smaller euro area as well as UK and Swiss banks (see Chart A).[2] Instead of raising new equity, banks could alternatively reduce risk-weighted assets to achieve the desired capital ratio. In the case of a targeted Tier 1 ratio of 10%, simulations show that risk-weighted assets would have to shrink by €469 billion for the group of euro area LCBGs and by €715 billion for the group of European banks.

Moreover, investors and regulators are increasingly focusing on high-quality capital such as core Tier 1 capital – which has the highest loss-absorbing characteristics – and on leverage ratios, instead of on the conventional Tier 1 capital ratios. Further simulations show that, on the basis of leverage ratios such as core Tier 1 to tangible assets (CT1), the capital shortfall is substantially

2 These computations are based on end-2008 figures, but also take into account the extra capital raised afterwards.

**Chart A European banks' Tier 1 capital ratios and capital shortfall**

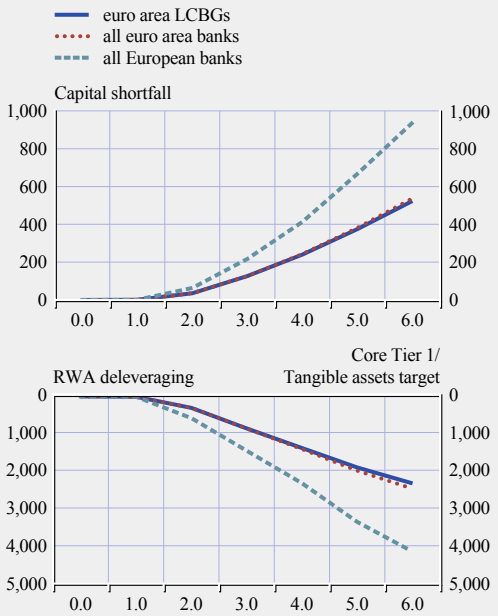
(EUR billions; percentages)




Sources: Individual financial institutions' balance sheet data and ECB calculations.
Note: Calculations are based on data for 22 euro area banks (16 of which are LCBGs) and 13 other European banks.

**Chart B European banks' core Tier 1 leverage ratios and capital shortfall**

(EUR billions; percentages)




Sources: Individual financial institutions' balance sheet data and ECB calculations.
Note: Calculations are based on data for 22 euro area banks (16 of which are LCBGs) and 13 other European banks.

higher (Chart B). The euro area banks would have to raise €240 billion in core Tier 1 capital to achieve a CT1 ratio of 4%, or would have to deleverage by €6 trillion, equivalent to a reduction of €1.3 trillion in risk-weighted assets. For the European banks, the capital shortfall would increase to €414 billion or require €10.3 trillion of (tangible) asset shedding, equivalent to a risk-weighted asset reduction of €2.3 trillion.

However, it should be stressed that a CT1 threshold of 4% or 5%, which market participants take as a norm, is inferred from US bank averages and is likely as such to be an unrealistic target for euro area banks owing to differences in the definition of assets under different accounting standards. Indeed, euro area banks follow the International Financial Reporting Standards (IFRSs), while US banks report under US Generally Accepted Accounting Principles (GAAP). The IFRSs are extremely restrictive as regards netting of derivatives on the balance sheet, while under US GAAP (or Swiss GAAP, which is similar), netting is much more widely permitted. This has as the effect that assets reported under the IFRSs may in some extreme cases appear almost twice as high as what they would be if reported under US GAAP.

Against this background, European banks are strengthening their capital bases in part by repaying junior bonds which are currently trading at large discounts to face value, mainly owing to concerns about the financial strength and viability of many institutions. The discounts can be booked as profits, which boosts core equity capital. However, repaying liabilities at discounts in combination with asset-shedding can only be one element of the efforts to strengthen banks' financial soundness in the short term and cannot be a substitute for capital that is generated from retained earnings.

## 4.2 BANKING SECTOR OUTLOOK AND RISKS

### EARNINGS RISKS

Despite the slightly improved first quarter 2009 financial results reported by many euro area LCBGs, the slowdown in global economic growth and the prospect of a further deterioration in macroeconomic conditions in most euro area countries implies significant challenges for LCBGs' earnings from core banking activities in the period ahead. In addition to cyclical pressures on banks' profitability, some LCBGs' business models, and thus their recurring earnings power, may be negatively affected by structural changes in their operating environment.

The persistent high funding costs, in particular, are likely to be one reason for a re-consideration of LCBGs' business models. In this vein, business lines that relied on high volumes of unsecured funding could see further a decline in activity. By contrast, other types of business which need less funding support, such as trading and underwriting activities in highly liquid markets, are likely to be emphasised in the future.

Looking at different components of LCBGs' income, growth in net interest income will be negatively affected by a lower volume of net new lending. Those LCBGs which reaped large shares of their past income from their operations in emerging market countries will probably experience a negative impact on their earnings prospects due to the slowdown in economic activity in these economic areas. Importantly, however, this could be partially offset by the steepening of the euro area yield curve (see also Box 13) and, to the extent that banks are pricing in higher credit risk, into their lending rates. In addition, there is anecdotal evidence that declining competition due to reduced cross-border activity by banks within the euro area is providing the remaining institutions with increased pricing power, especially in parts of the the corporate lending market. At the same time, competition has also intensified in the retail deposit markets, which would reduce the LCBGs' earnings potential by increasing their financing costs.

On the non-interest income side, as discussed in Section 4.1 above, LCBGs' earnings from

the trading and underwriting businesses have increased and, given the wide bid-ask spreads in most trading markets, it is to be expected that these income sources will continue to support the banks which are most active in these businesses in the period ahead. At the same time, several LCBGs could continue to see their earnings dented by marking-to-market write-downs on their holdings of legacy assets and securities. In addition, the ongoing deleveraging process, which has largely focused on more liquid trading book assets, will constrain these institutions' capacity to generate earnings for some time to come.

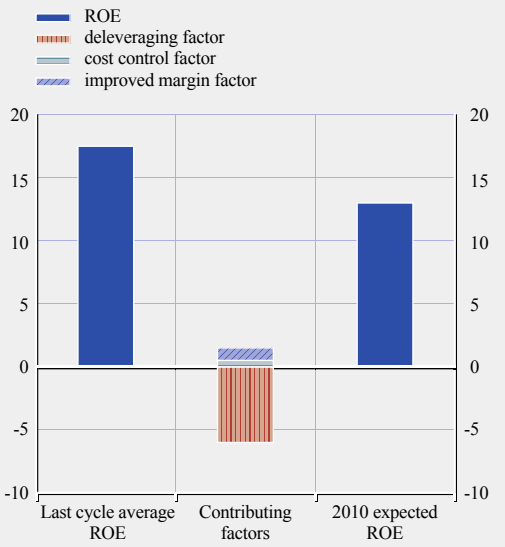
Growing pressure from LCBGs' shareholders to return to profitability will put the banks' cost structures under intense scrutiny. Despite the substantial cost-cutting that has been carried out by many of these institutions to date, costs will probably need to be reduced further. The expected intensification of consolidation in the euro area banking sector will probably contribute to lower costs by reducing overcapacity in some markets.

Chart 4.9 shows some private sector baseline estimates of how large banks' average ROE is expected to evolve in the coming 18 months, compared with the average ROE of 17.5% over the previous industry cycle of 1987-99. The average ROE is expected to decline to 13%, with the negative impact of deleveraging being the most substantial drag on future earnings. This is expected to be offset somewhat by improvements in cost control and by improved margins in core businesses.

Reflecting the still sluggish overall outlook for earnings, analysts' forecasts of net income for the euro area LCBGs imply only a gradual recovery over the coming years, although all of these institutions are expected to return to positive net income by 2011, allowing them to start generating organic capital (see Chart 4.10).

**Chart 4.9 Expected evolution of average return on equity and contributing factors for euro area large and complex banking groups**

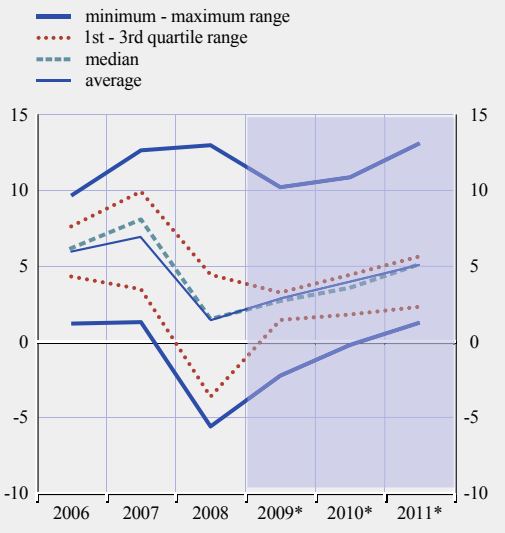
(percentage)




Sources: Morgan Stanley and Oliver Wyman.
Note: The figures show average numbers for a group of global wholesale banks which includes a large share of euro area LCBGs.

**Chart 4.10 Euro area large and complex banking groups' net income and analysts' forecasts**

(2006 – 2011; percentage change per annum)




Source: Bloomberg.
Note: The figure shows profits after all costs have been deducted.

The overall impact of declining revenues and rising impairments is likely to depend on the severity of the credit cycle downturn. Expectations of a further deterioration in banks' earnings were already reflected in the rating downgrades for several LCBGs in December 2008 and in early 2009 (see also Section 4.3).

Box 13

## ELASTICITY OF BANKS' INTEREST INCOME VIS-À-VIS RECENT CHANGES IN SHORT-TERM MARKET RATES

In the context of the current severe pressure on banks' earnings and solvency, a direct and immediate channel through which bank profitability may be strengthened is via the effect of recent changes in short-term money market rates on banks' net interest income. This box provides some estimates of the impact of recent declines in short-term money market interest rates (in part triggered by the monetary policy easing by the ECB) on banks' net interest income from loans and deposits.

The analysis is carried out in two steps. First, country-specific error-correction regressions of the change in the average interest rate paid on outstanding loans and deposits respectively, on changes in the three-month EURIBOR are conducted.[1] In particular, the following error correction model is estimated:

$$\Delta BR_t = \alpha + \sum_{i=0}^{n} \beta_i \Delta MR_{t-i} + \gamma(BR_{t-1} + \theta MR_{t-1})$$

where $BR_t$ is the composite interest rate on either loans to or deposits from the non-financial private sector, $MR_t$ is the three-month EURIBOR, $\Delta$ indicates the first difference and the optimal lag length $n$ is determined by a Bayesian information criterion.

Second, the multipliers on the changes in the money market rate, $\beta_i$, from these regressions are related to changes in the three-month EURIBOR, which declined by 1.61 percentage points between December 2008 and 28 May 2009. Using the amounts of loans and deposits outstanding as of end-December 2008, it is possible to calculate the effect on the interest receivables (i.e. on loans) and interest payments (i.e. on deposits) of the euro area monetary financial institution (MFI) sector arising from the recent decline in short-term rates.[2]

The results of the first step of this exercise are shown in Table A. Generally, the multiplier coefficients of short-term money market rates are higher for deposit rates than for lending rates in countries where banks operate predominantly with long-term fixed rate loans (e.g. Belgium, Germany and France). The opposite is generally the case for countries with predominantly floating rate and short-term lending (i.e. most of the other countries), where lending rates seem to react more strongly to changes in short-term market rates. However, when deriving the effect on banks' net interest income (from loans and deposits) account also needs to be taken of the amounts outstanding of loans and deposits. In other words, the overall effect on interest income hinges on the extent to which the country's banking sector operates with a "funding gap"

1 The MFI lending and deposit rates are applied to outstanding amounts as reported in the MFI interest rate statistics.
2 This analysis is partial as it obviously disregards any changes to the amounts outstanding since end-December 2008.

**Table A Interest rate multiplier, funding gap and interest rate payments of euro area banks**

(Dec. 2008; EUR billions)

| | Immediate multiplier on three-month EURIBOR | | Funding gap | Interest receipts | Interest payments | Net interest income |
|---|---|---|---|---|---|---|
| | Loan rate | Deposit rate | | | | |
| Sum | n.a. | n.a. | 1,146 | 584 | 256 | 328 |
| Mean | 0.25 | 0.18 | 104 | 53 | 23 | 30 |
| Median | 0.22 | 0.19 | 74 | 21 | 10 | 15 |
| Maximum | 0.60 | 0.42 | 429 | 138 | 77 | 72 |
| Minimum | 0.05 | 0.06 | -293 | 8 | 3 | 5 |
| Standard deviation | 0.17 | 0.11 | 217 | 48 | 23 | 27 |
| Floating rate countries [1] | | | | | | |
| - sum | n.a. | n.a. | 956 | 282 | 104 | 178 |
| - mean | 0.29 | 0.18 | 137 | 40 | 15 | 25 |
| Fixed rate countries [2] | | | | | | |
| - sum | n.a. | n.a. | 190 | 302 | 152 | 150 |
| - mean | 0.17 | 0.19 | 47 | 76 | 38 | 37 |

Sources: ECB, Reuters and ECB calculations.
Note: The effect is derived using country-specific error-correction regressions of the change in the composite loan and deposit rates respectively, on the change in the three-month EURIBOR for the period from January 2003 to December 2008 (monthly data).
1) "Floating rate countries" include Ireland, Greece, Spain, Italy, Austria, Portugal and Finland. In this group of countries, the majority of new business loans are provided with floating rates and an initial rate fixation of up to one year.
2) "Fixed rate countries" include Belgium, Germany, France and the Netherlands. In this group of countries, a major proportion of new business loans (in particular to households for house purchase) are granted with initial rate fixation of over five years.

(in the sense of deposits being insufficient to finance lending). Indeed, the funding gap (as of end-December 2008) is sizeable in the majority of the euro area countries (see Table A).

All in all, focusing on the results regarding the decline in the three-month EURIBOR (the results for the EONIA, which are not reported, are similar), net interest income should generally be expected to fall in the euro area (see Table B). However, the total euro area effect is largely driven by countries where "floating rate" lending is predominant. Apart from the pure interest elasticity effect, this also reflects the comparatively large funding gap of the banking sector in most of these countries. For the group of countries where "fixed rate" lending is predominant, by

**Table B Estimated changes in euro area MFIs' interest income on outstanding loans and deposits between 31 December 2008 and 28 May 2009**

(EUR billions)

| | Loans | Deposits | Net effect |
|---|---|---|---|
| Sum | -30.77 | -22.18 | -8.59 |
| Mean | -2.80 | -2.02 | -0.78 |
| Median | -1.64 | -1.36 | -0.39 |
| Maximum | -0.42 | -0.37 | 2.66 |
| Minimum | -6.76 | -8.43 | -4.48 |
| Standard deviation | 2.25 | 2.29 | 1.97 |
| Floating rate countries [1] | | | |
| - sum | -18.41 | -7.54 | -10.87 |
| - mean | -2.63 | -1.08 | -1.55 |
| Fixed rate countries [2] | | | |
| - sum | -12.36 | -14.64 | 2.28 |
| - mean | -3.09 | -3.66 | 0.57 |

Sources: ECB, Reuters and ECB calculations.
Note: The effect is estimated using the country-specific multipliers reported in Table A. In a second step, the multiplier is combined with the aggregate amounts outstanding of loans and deposits in the country to derive the overall effect of the recent decline in the three-month EURIBOR on the interest received on loans and the interest paid on deposits.
1), 2) See Table A.

contrast, the net effect turns out to be slightly positive (importantly, the funding gap is also much smaller, on average, in this group of countries). However, despite the expected declines, the net interest income on loans and deposits of the banking sector remains significantly positive in all euro area countries, as a result of both the still positive loan-deposit margins and the substantial funding gap (in most countries). Moreover, it needs to be kept in mind that the overall effect on banks' net interest income also hinges on the interest elasticity of banks' holdings of debt securities and their non-deposit funding sources. It is not unlikely that especially the latter is highly correlated with short-term market rates, which should somewhat mitigate the generally negative net effect on net interest income found to stem from the recent rate decline. At the same time, to the extent that euro area banks are currently trying to reduce their funding gap, the validity of the reported results may become more pertinent in the future.

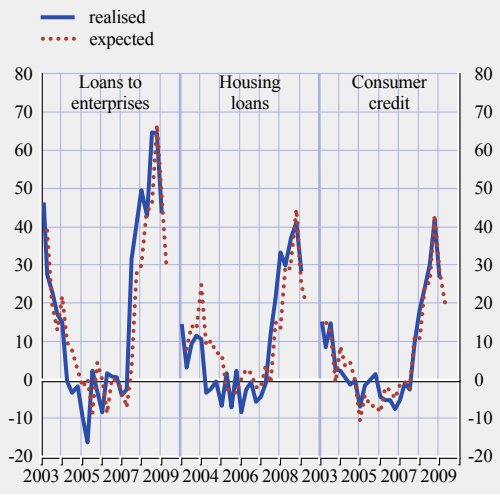
## CREDIT RISKS

Against the background of a sharper than expected deterioration in macroeconomic conditions in many parts of the euro area, the credit quality of LCBGs' loan books has come under significant downward pressure. This may have increased the intensity of the adverse feedback loops in which credit market conditions restrain economic growth in the period ahead, leading to a further increase in credit risk and an additional reduction in credit availability.

Evidence from the January and April 2009 bank lending surveys for the euro area suggests that banks have responded to the less favourable operating environment by continuing to tighten their credit standards for new loans both to households and to the non-financial corporate sector. In the first quarter of 2009, euro area banks reported a further tightening of credit standards for both borrower categories, although the degree of net tightening was somewhat smaller than in the previous quarter (see Chart 4.11). The main factors contributing to the net tightening of credit standards were reported to be an increase in risk as perceived by banks and, to a somewhat lesser extent, balance sheet constraints facing the banking sector. The same survey also revealed that banks expected the tightening of credit standards to continue in the second quarter of 2009.

**Chart 4.11 Changes in credit standards of banks in the euro area**

(Q1 2003 – Q2 2009; net percentage of banks tightening credit standards)




Source: ECB.

### Household sector credit risks

The outlook for the quality of LCBGs' loans to households has deteriorated significantly, although large differences still remain across euro area countries. As discussed in detail in Section 2.4, lending to households continued to decelerate in many parts of the euro area in the second half of 2008. Forward-looking information from the April 2009 bank lending survey suggests that the slowdown in household credit growth is likely to continue in the second quarter of 2009.

In some euro area countries, household sector credit risks may be further aggravated by the risk of property market corrections. In these countries, indications of a deterioration in banks' mortgage asset quality are evident in

their non-performing loan ratios or arrears in the first three quarters of 2008. Arrears are likely to increase further in many parts of the euro area, albeit from a historically low level. A number of government relief measures aimed at limiting the number of household foreclosures are being considered or introduced in a few euro area countries. These measures tend to entail, among other things, loan modifications, maturity extensions and adjustments of instalment payments. While the measures might prove to be effective in preventing foreclosures, they may – from the banks' perspective – at the same time increase uncertainty as regards expected cash flows on residential mortgage-backed securities. All in all, the prospect of deteriorating household sector credit quality ranks among the key vulnerabilities facing banks in several countries in the period ahead.

### Corporate sector credit risks

As discussed in detail in Section 2.2, since the third quarter of 2008, the prospect of a marked deterioration in the economic environment, together with the likelihood of financing conditions remaining tight, has pointed to increasing default risk among euro area non-financial firms. Weak aggregate demand is likely to weigh heavily on non-financial corporations' earnings in 2009, while the rise in the cost and the reduction in the availability of credit, partially reflecting signs of decreasing competitive pressures in the euro area corporate loan market, point to increased refinancing costs, in particular for speculative-grade borrowers. Country-level information suggests that firms' access to credit lines has been reduced and the renegotiation of credit lines and terms could prove challenging in the current environment. Furthermore, conditions for trade financing appear to have worsened significantly. This is apparent, in particular, in the reduction in the availability of international trade credit. A deterioration of credit conditions is also reflected in tightened collateral conditions.

Against this background, some LCBGs with significant leveraged loan portfolios face the risk of increasing loan losses, as slowing or negative GDP growth and tight financing conditions are likely to have an adverse impact on the refinancing prospects of the more highly geared firms. Indeed, the level of distress in the European leveraged loan market increased substantially in the first few months of 2009, with the number of firms in distress (i.e. in default or entering restructuring) in the first quarter exceeding the number recorded in 2008 as a whole.[9] The volume of distressed leveraged loans (original-issue senior debt) was €15 billion, mostly held by banks. In the primary European leveraged loan market there was virtually no activity in the first quarter of 2009, with overall issuance of around €1 billion, more than 80% down from the same period in 2008.[10]

Finally, many LCBGs are significantly exposed to commercial property markets (see Section 2.3 for developments in this sector). Owing to a continued deterioration in these markets in most parts of the euro area, several banks face the prospect of loan losses on commercial mortgage portfolios and/or marking-to-market losses on commercial mortgage-backed securities (CMBSs). Indeed, some LCBGs face downward rating pressure, in part as a result of their exposures to commercial property.

### Outlook for LCBGs' credit portfolio risks under alternative scenarios

The outlook for LCBGs' credit risk can be assessed using low-probability but plausible scenarios of future macro-financial developments.[11] In what follows, publicly available data on euro area LCBGs' exposures to different types of loans, together with borrower-specific probability-of-default (PD) and loss-given-default (LGD) data, allow measures of

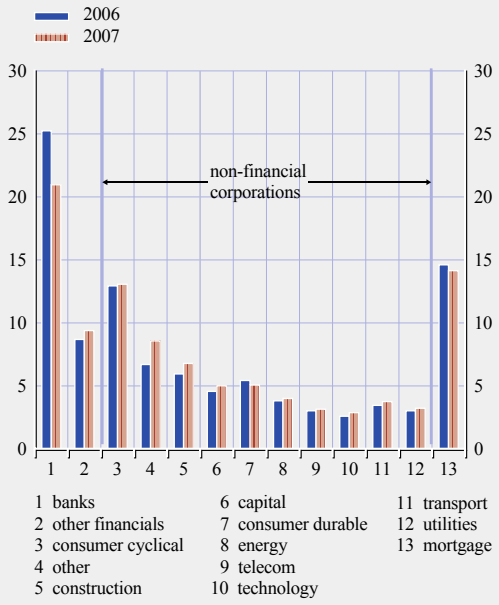
9 See Standard & Poor's, "LCD Eurostats", April, 2009.

10 As institutional investors (such as structured finance vehicles, mutual funds and insurance companies) have exited the primary market, the limited issuance volumes are almost entirely financed by banks. In the secondary loan market, activity has picked up for the highest quality borrowers. However, prices in the broader market have continued to decline, as market sentiment remains poor.

11 It should be stressed that this exercise is separate to the one announced by the Economic and Financial Committee (EFC) and coordinated by the Committee of European Banking Supervisors (CEBS). This latter exercise, where the ECB plays an important role, is expected to be finalised by September 2009.

**Chart 4.12 Sectoral distribution of euro area large and complex banking groups' loan exposures**

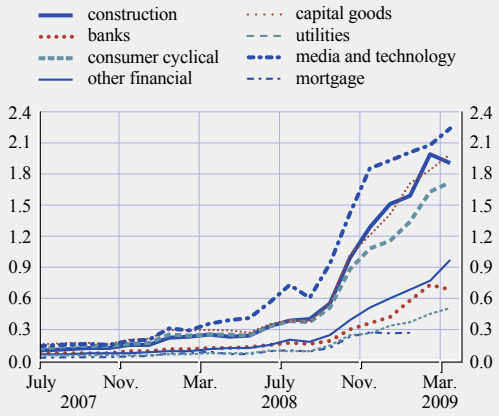
(percentage of total loans)




Sources: Individual institutions' financial reports and ECB calculations.
Note: Industry breakdowns are based on an internal aggregation method using the NACE industry classification as a basis.

**Chart 4.13 Unconditional expected default frequencies for selected sectors in the euro area**

(July 2007 – Mar. 2009; percentage probability)




Sources: Moody's KMV and ECB calculations.
Note: The expected default frequencies (EDFs) provide an estimate of the probability of default over the following year. Owing to measurement considerations, the EDF values are restricted by Moody's KMV to the interval between 0.01% and 35%. The sector "capital goods" covers the production of industrial machinery and equipment.

credit value at risk (VaR)[12] to be estimated for each LCBG's loan portfolio.[13] These credit VaR results (baseline scenario) are compared, in a second step, with stressed VaR measures that incorporate increased borrower-specific PDs for different macroeconomic shock scenarios.

Chart 4.12 provides a breakdown of the lending exposures of euro area LCBGs at the end of 2006 and 2007, the last year for which full-year figures are available.[14] Among the largest were exposures to other banks and financial intermediaries (around 20%), mortgage loans (around 15%), the consumer goods sector (around 12%) and other financial institutions (around 7%).

The geographic distribution of loan exposures across LCBGs reveals that, on average, around 75% of the loans extended are to borrowers located in euro area countries. 7.5% of total lending is to borrowers in emerging market economies, 12.5% to borrowers residing in North America and 4% to borrowers in the rest of the world, which includes the non-euro area EU countries and countries in emerging Europe.

Chart 4.13 plots the dynamics of sector-specific PDs, which increased sharply after the finalisation of the December 2008 FSR. The PDs for the construction, energy and capital

12 Credit VaRs are a standard tool applied by banks' risk managers, rating agencies and prudential supervisors. They typically indicate the amount of economic capital that is needed to cover 99.9% of unexpected losses in a scenario where the credit quality of the banks' existing borrowers might change. Expressed as a ratio to existing Tier 1 capital, the credit VaR can provide an indication of whether or not Tier 1 capital is sufficient to absorb the losses that would materialise in such a scenario.

13 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*, No 1002, February 2009.

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

goods sectors, as well as for banks and other financial institutions, increased most (almost by 200%). The remaining sectors showed more moderate but still substantial increases. Comparing the recent rises with past episodes of financial distress shows that while these changes are large, they have not yet reached the peak levels in the historical series. For example, in the aftermath of the sharp correction in the euro area stock market in 2000-02, most sector-level PDs reached levels that were more than twice as high as the most recent values.

On the basis of these empirical PDs and data on the composition of LCBGs' loan portfolios, a baseline scenario and hypothetical adverse scenarios for credit VaRs can be calculated for euro area LCBGs. Importantly, these calculations do not take into account any mitigating impact on capital that would come from the banks' ability to generate new capital by retaining some of their future earnings. Bearing this caveat in mind, and taking into account the risks and vulnerabilities identified in other parts of this FSR, the following scenarios were applied:

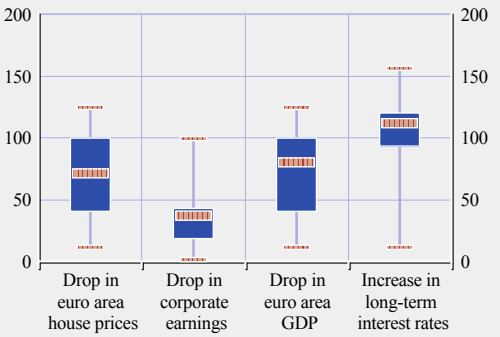
(i) a decrease in average euro area house prices (see Section 2.4);
(ii) a decrease in corporate profits in the euro area (see Sections 2.2 and 2.3);
(iii) a decrease in euro area GDP (see Sections 1.1 and 2.1); and
(iv) an increase in long-term interest rates, reflecting the change in the outlook for public finances.

To quantify these scenarios, the lower confidence bounds of the simple univariate 95% interval forecasts for the relevant variables over the next 15 months were used. This means that the scenario has a 2.5%, i.e. very low, probability of materialising by May 2010.

In scenario (i), this translates into a decrease by 6% in average euro area house prices. Scenario (ii) entails a decline of 12.4% in euro area corporate sector profits (measured by the Purchasing Managers' Index (PMI)).

**Chart 4.14 Changes in credit VaRs relative to the baseline scenario across euro area large and complex banking groups under different scenarios**

(percentage of Tier 1 capital; maximum, minimum, interquartile distribution and median)




Sources: Individual institutions' annual reports and ECB calculations.

Scenario (iii) uses a decrease of 2.7% in the year-on-year growth rate of euro area GDP. Finally, scenario (iv) incorporates an increase of 1.3% in euro area long-term interest rates.[15]

Mapping the effects of the four scenarios for borrower PDs to the individual LCBGs' credit VaRs shows that changes in credit VaRs relative to the baseline scenario are relatively heterogeneous across both scenarios and individual LCBGs.[16]

Chart 4.14 shows that an increase in long-term interest rates would have the largest impact on the LCBGs' median credit VaR, followed by a drop in euro area output and a rise in house prices. A drop in corporate earnings results in a change relative to the baseline that is just over half that in the previous two scenarios. Important to note in this context is that the median increase in credit VaRs corresponds to less than 60% of Tier 1 capital over all scenarios. Compared with the credit VaR estimates given in the December 2008 FSR, which covered all

15 These figures refer to changes in the relevant variables between the start and the end point of the forecast horizon. This means that even if some of the variables, such as the euro area GDP growth, may currently be forecast to take more "severe" values before the chosen endpoint in May 2010, the figures in the text should be compared with other point forecasts referring to this date.

16 The mapping process is based on a vector autoregressive estimation framework that incorporates PDs and macro-financial factors.

scenarios except for the increase in long-term interest rates, the median changes relative to the baseline scenario are significantly larger. This stems from the fact that sectoral PDs have increased as a result of the advancing of the credit-cycle downturn in the euro area (see Chart 4.13).

The severity of the scenarios that were applied, and the low probability of their materialising, means that the capital ratios of some institutions can be expected to be adversely affected. Indeed, the results show that for those LCBGs for which the baseline credit VaRs are the highest (corresponding to a higher risk profile in their loan books), some of these scenarios could, if they were to materialise, cause solvency ratio problems. Moreover, if more than one scenario were to materialise at the same time, the outcomes would be more severe for most LCBGs in this sample. However, the additional capital buffers that are currently being raised by these institutions, together with the future earnings that they will be able to put aside as new capital, should safeguard them against such adverse events.

Finally, like all model-based estimates, these results can be sensitive to the specific confidence level chosen. In addition, they do not account for any hedging of credit risk exposures. Thus, and together with the assumption of no retained earnings, the reported changes in credit VaRs relative to the baseline should be seen as representing an upper bound to the credit VaRs to which these institutions could be exposed.

Box 14

## ESTIMATING POTENTIAL WRITE-DOWNS CONFRONTING THE EURO AREA BANKING SECTOR AS A RESULT OF THE FINANCIAL MARKET TURMOIL

As the global financial turmoil has unfolded, several estimates have been made, both by public and private sector institutions, of the potential losses to be absorbed by financial systems. In order to assess the magnitude of probable losses the euro area banking sector faces, this box presents an estimate of total potential write-downs until the end of 2010. Combining these estimates with what is already known about banks' write-downs on credit-linked securities and losses on loans since the eruption of the market turmoil in August 2007, an estimate of total (past and expected) write-downs is also made.[1]

The first step in estimating potential losses is to gauge the size of exposures of euro area banks to various types of securities where losses could be faced. This was done following a bottom-up, bank-by-bank, approach. In particular, individual bank financial reports were investigated to assess the nature and scale of exposures of euro area banks to US-originated securities.[2] Loan exposures of euro area banks, as well as write-offs on these loans in 2007 and 2008, were taken from the ECB's MFI statistics and data on loan loss provisions were extracted from the ECB's consolidated banking data.[3]

1 The methodology adopted in this box broadly follows that used by the International Monetary Fund in the estimates published in the Global Financial Stability Report in April 2009, with an important difference that the euro area loan loss estimates presented here are based on empirical relationships estimated in euro area data.
2 This information was complemented with data published by the European Securitisation Forum on exposures across various types of securities.
3 It should be noted that there are differences in the consolidation approaches used in these two data sets. The consolidated banking data are consolidated both across borders and across sectors so that data on branches and subsidiaries located (from the reporting country's point of view) outside the domestic market are included in the data reported by the parent. In the ECB's MFI statistics, the data are not consolidated at the level of the banking group, with each instituition reporting on a so-called solo basis. The consolidated banking data are only reported annually, while the ECB's MFI statistics are available at a monthly frequency. In addition, the consolidated banking data is less timely than the ECB's MFI statistics.

## Estimated potential write-downs for the euro area banking sector

(USD billions)

| | Euro area banks securities | |
|---|---|---|
| | Outstanding | Cumulative implied write-downs |
| **US-originated securities** | | |
| Sub-prime/Alt-A securities | 106 | 59 |
| Prime mortgages backed securities (MBSs) | 94 | 2 |
| **Total** | | **61** |
| **European-originated securities** | | |
| Residential mortgage-backed securtities (RMBSs) | 397 | 60 |
| Collateralised debt obligations (CDOs) – non-sub-prime | 158 | 32 |
| Commercial mortgage-backed securities (CMBSs) | 68 | 19 |
| Consumer asset-backed securities (ABSs) | 69 | 5 |
| Other ABSs | 15 | 1 |
| Collateralised loan obligations (CLOs) | 40 | 11 |
| Corporate debt | 553 | 29 |
| | **1,500** | **157** |
| **Total for securities** | | **218** |

| Sector | Euro area bank loan exposures | |
|---|---|---|
| | Outstanding | Realised and expected losses |
| **Households** | **6,520** | **200** |
| o/w mortgages | 4649 | 44 |
| o/w consumer | 847 | 62 |
| o/w other | 1,024 | 95 |
| **Corporates** | **6,489** | **230** |
| **Total for loans** | **13,009** | **431** |
| **Total for loans and securities** | | **649** |
| Bloomberg estimate of write-downs as of 28 May 2009 | | 215 |
| Loan loss provisions and write-offs in 2007-08 | | 150 |
| **Potential further losses** | | **283** |

Sources: Individual banks' disclosures, European Securitisation Forum, IMF, ECB and ECB calculations.
Note: Euro values were converted to US dollar figures using the average exchange rate in the period from March to May 2009 (EUR 1 = USD 1.33).

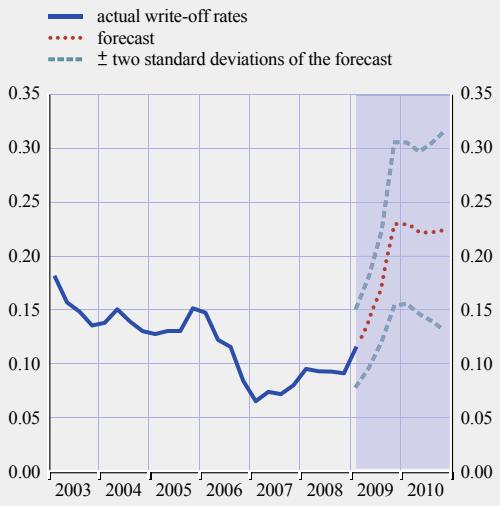
An estimate of the cumulative implied losses due to write-downs on securities – i.e. the mark-to-market of losses that banks have suffered as a result of falling securities values – was calculated by combining information on the magnitude of the exposures of euro area banks with information on default probabilities extracted from various CDS indices (or CDS spreads). The loss ratios from particular securities were derived from changes in securities prices and multiplied by the outstanding amounts held by euro area banks. The resulting figures represent the cumulative implied write-downs on securities exposures since the beginning of the turmoil. In principle, because such prices are forward-looking, they should embed expectations of future net losses on the assets that ultimately lie behind the securities. While this means that it is not necessary to compute a figure for expected losses on securities, it is important to bear in mind that this estimate will change as securities prices change.

Total losses on loans were calculated by adding up the net write-offs and provisions[4] reported by banks in 2007-2008 and expected future write-offs and provisions in 2009-2010. The expected write-offs and provisions were estimated by projecting a path for future write-off rates. These

4 Provisions and write-offs take account of net value readjustments, such as net write-back and recovery following earlier value adjustments.

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

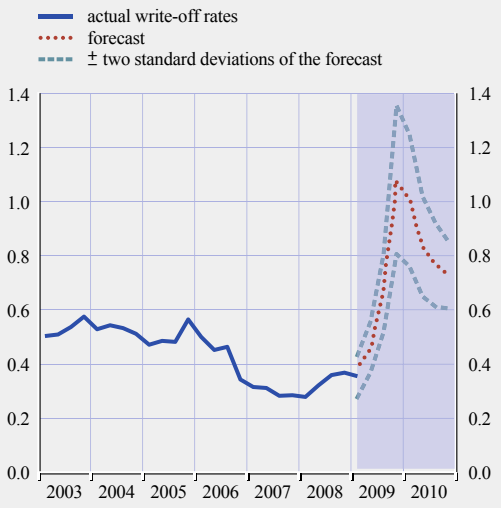
(Q1 2003 – Q4 2010; percentage)




Sources: ECB and ECB calculations.

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

(Q1 2003 – Q4 2010; percentage)




Sources: ECB and ECB calculations.

projections were based on empirical regressions which related household and corporate loan write-off rates to a set of macroeconomic variables, such as GDP growth, the unemployment rate, house price changes and expected default frequencies. The paths of exogenous variables for 2009 and 2010 were based on the macroeconomic forecasts for the euro area published by the European Commission in early May 2009. These forecasts see euro area GDP contracting by 4% in 2009 and by 0.5% in 2010. In the absence of quarterly data on loan loss provisions, these were assumed to be proportional to write-offs.[5]

The results show that euro area banks could face cumulative total losses of USD 218 billion on their exposures to securities, and an additional USD 431 billion of losses on their loan books (see Table A). This comes down to a total loss estimate of USD 649 billion over the period 2007-10. By the cut-off date of this FSR, the write-downs on securities by euro area banks had amounted to USD 215 billion.[6] At the same time, in 2007 and 2008 euro area banks provisioned and wrote-off USD 150 billion of their loan exposures. Looking ahead, therefore, there is potential for euro area banks to suffer a further USD 283 billion in losses, mainly originating from loan exposures. These losses would have to be buffered by additional provisioning and retained earnings over the next two years. There is however a high degree of uncertainty surrounding the outlook for banking sector profitability, which makes it very difficult to forecast banks' future retained earnings with a reasonable degree of accuracy.

Adequate interpretation of the loss figures requires that important caveats and limitations underlying these estimates are acknowledged. First, there is uncertainty about the scope and distribution of banks' exposures to securities, since some banks do not provide sufficiently detailed information on their exposures to various assets to make accurate calculations. Second, the confidence intervals surrounding the projections of write-off rates on mortgages and corporate

5 The proportionality factor used was the average ratio of write-offs to provisions in 2006 and 2007.
6 According to Bloomberg.

loans are rather wide (see Charts A and B), meaning that the estimates of total loan losses are likewise characterised by a high degree of uncertainty. This is especially the case for mortgage lending where write-off rates were unusually low over the last few years. Third, accounting rules in some euro area countries allow banks to delay reporting write-offs on loans to some extent. This may contribute to under-reporting of loan losses in good times and to substantial increases in provisioning during downturns. Against this background, write-off rates could increase by more than currently anticipated. Finally, a possible further deterioration in the economic environment would shift the projected path for write-off rates further upwards, thus increasing the loan loss estimates. Worsening macroeconomic conditions could also put pressure on securities prices and increase the likelihood of further losses on banks' securities exposures. That said, if macroeconomic conditions were to develop more favourably than currently forecast, loan losses might well turn out to be lower than indicated by these estimates.

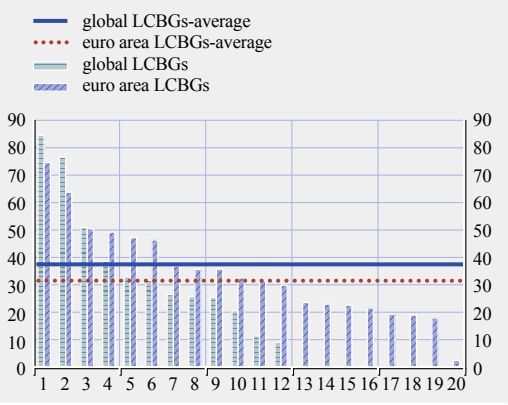
All in all, there are many uncertainties surrounding estimates of the potential losses that euro area banks are likely to face over the next 18 months. These uncertainties reflect the availability and timeliness of data, the assumptions made in modelling and forecasting loan losses, as well as the macro-financial scenario envisaged. This means that differences in methodologies or assumptions can result in substantial differences in loss estimates. Against this background, and in the absence of detailed supervisory information about loan and securities exposures, no individual figure should be taken at face value. The wide range of estimates published by private and public sector institutions calls rather for constant monitoring and cross-checking of findings by central banks and supervisory authorities.

## MARKET-RELATED RISKS

Since the finalisation of the December 2008 FSR, market-related risks for euro area LCBGs have remained elevated. This is mainly due to high volatility in several asset classes, linked primarily to continuing distress in various financial markets. Prospects for future stresses in LCBGs' trading books remain significant. In particular, trading losses are likely to remain sizeable, while the possibility of adverse developments in the value of marked-to-market financial instruments cannot be excluded. This expected further distress may force LCBGs to allocate more capital for market risk and, at the same time, reduce their trading book exposures.

**Chart 4.15 Size of large and complex banking groups' trading books**

(2008; percentage of total assets)




Sources: Bloomberg and ECB calculations.

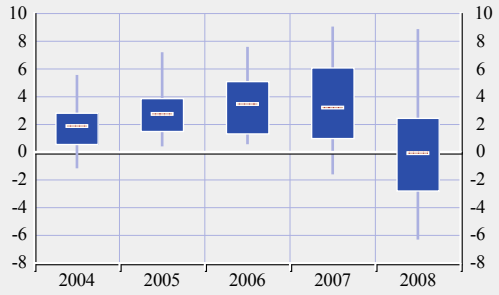
Balance sheet information on trading book exposures suggests that, on average, euro area LCBGs had slightly smaller trading book exposures in 2008 (35% of total assets) than their global peers (which had, on average, 40% of total assets classified in trading books, see Chart 4.15). This is an indication that global institutions may have been more exposed to increasing volatility and marking-to-market losses.

Earnings at risk related to trading activities of euro area LCBGs provides a measure of these institutions' market risk.[17] Earnings at risk can

17 In the drafting process of this section, 2008 market VaR information was only available on a rather incomplete sample of euro area LCBGs.

**Chart 4.16 Trading income of euro area large and complex banking groups**

(2004 – 2008; EUR billions; maximum, minimum, interquartile distribution and mean)




Source: Bloomberg.

**Chart 4.18 Euro area yield curve developments (based on euro swap rates)**

(percentage)


Sources: ECB, Reuters.

be captured by the share of trading income in total operating income, and its volatility. In 2008 trading income contributed negatively to euro area LCBGs' total operating revenues, which was mirrored in trading income losses for many LCBGs in 2008 (see Chart 4.16). This fall in trading income reflects both losses related to trading activities and marking-to-market write-downs on securities investments.

In addition, the volatility of trading income increased markedly across euro area LCBGs in the last few quarters of 2008 (see Chart 4.17).

**Chart 4.17 Contribution of euro area large and complex banking groups' trading income volatility to their total operating income volatility**

(Q1 2007 – Q1 2009; percentage of total income volatility)


Sources: Bloomberg and ECB calculations.

Equity risks and interest rate risks play the largest role in total market-related risks for euro area LCBGs. Interest rate risks declined somewhat after the publication of the December 2008 FSR, reflecting in part the recent partial easing of the stresses in the euro area interbank market (see Section 3.1). Moreover, the euro area yield curve (which can give some indication of the risks to income derived both from banking books and from fixed income assets held in trading books) steepened, as the interest rate decline has been more pronounced at the short end than at the long end of the curve. This suggests some scope for recovery in revenues from fixed rate loans and debt instruments (see Chart 4.18).

Like interest rate risks, equity risks in banks' trading books depend to a large extent on the volatility of the equity portfolio. For euro area LCBGs, this can be approximated by the implied volatility derived from options on the Dow Jones EUROSTOXX 50 equity index (see Chart 4.19). This measure of volatility remained at around 30-40% in the first few months of 2009. Assuming the same portfolio composition as in 2007, the VaR figures should have increased in 2008, which could indicate a need for higher levels of capital to cover the market risks in equity portfolios.

**Chart 4.19 Implied volatility for the Dow Jones EUROSTOXX 50 index**

(Jan. 2008 – May 2009; percentage)


Source: Bloomberg.

Additional risks to banks' trading books are related to the possibility of further write-downs in structured credit products. Current market estimates of future write-downs relative to total exposures to these securities suggest that further revaluations of trading book exposures cannot be ruled out (see also Box 14).

### Counterparty risks

Since the finalisation of the December 2008 FSR, owing to a high number of already experienced counterparty credit risk incidents and continuing signs of financial distress at various institutions, there has been an increased and widespread appreciation of counterparty credit risk issues among banks and other market participants alike. According to market intelligence, this has led to substantial changes in associated risk management practices.

In particular, there has been an increasing focus on margining terms,[18] loss tolerance levels and interdependence between institutions. In addition, more attention has been paid to potential early warning signals. In order to anticipate impending problems, some large banks, for example, have been monitoring margin disputes, as well as clearing and settlement flows, much more closely. Any breaches of credit limits and other contractual agreements have been reportedly dealt with utmost care, which was not always the case before the eruption of the turmoil.

At the same time, it is notable that the interplay among banks and various other counterparties has become more intricate, in the sense that risk managers, through their credit decisions, might influence the viability of counterparties, thereby ultimately also becoming responsible for the overall functioning of the market.

On account of large numbers of incidents during the recent turmoil, many counterparty risk management practices have been tested in practice. This has provided risk managers with valuable experience and has allowed them to streamline various processes and procedures, including close-outs in the event of counterparty default.

In this context, it is noteworthy that recent multiple credit events in the CDS market, including some incidences of double default,[19] have not resulted in major dislocations or counterparty credit losses, and post-event settlements were handled successfully. Nevertheless, the centralised clearing of a majority of CDS contracts, especially plain-vanilla contracts, remains an immediate priority, as it should reduce counterparty credit risk and allay concerns about systemic risk.

By late May 2009, counterparty credit risk concerns, as judged by the CDS premia of major global dealers, including some euro area LCBGs, remained high. Moreover, aggregate and individual interbank limits for unsecured credit remained well below pre-crisis levels.

According to market intelligence, some larger non-bank counterparties, the most important of

18 In a nutshell, the margining terms consist of an initial margin or haircut set at the outset of a transaction and the arrangements for adjusting the amounts of posted collateral throughout the life of the transaction.

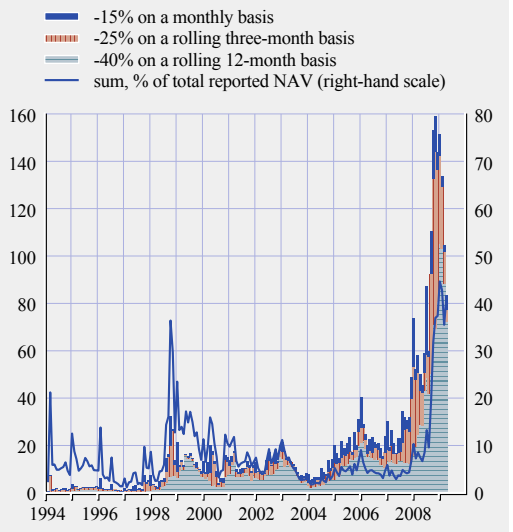
19 A double default refers to a situation when both the counterparty and the reference entity of a CDS transaction default simultaneously.

which are hedge funds, had managed to negotiate triggers and other credit terms that would offer them more protection in the event of a bank's default, despite banks' resistance to such terms. For example, some larger hedge funds had requested and obtained triggers which granted them the right to terminate transactions with the bank and seize the collateral if the bank's CDS premium were to rise above 1,000 basis points.

Nevertheless, many dealing terms still remained one-sided and far more favourable for the prime broker banks than for the hedge funds. Usually only larger hedge funds could expect to benefit from two-way margining, where both the hedge fund and the bank have to post/return collateral in line with changes in market prices. Furthermore, banks had been resistant and selective when granting margin lock-ups, which involve fixing haircuts and other margining terms for a specified period of time.

**Chart 4.20 Estimated total net asset value (NAV) and proportion of hedge funds breaching triggers of cumulative total NAV decline**

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




Sources: Lipper TASS database and ECB calculations.
Note: Excluding funds of hedge funds. Net asset value (NAV) is the total value of a fund's investments less liabilities; it is also referred to as capital under management. If several typical total NAV decline triggers were breached, then the fund in question was only included in the group with the longest rolling period. If, instead of one fund or sub-fund, several sub-fund structures were listed in the database, each of them was analysed independently. The most recent data are subject to incomplete reporting.

As a result of severe hardship in the hedge fund sector (see Section 1.3), banks have had manifold opportunities to renegotiate and render financing terms even more in their favour owing to numerous breaches of net asset value-based triggers (see Chart 4.20). Prime brokers had reportedly also been insisting on termination triggers based on a cumulative decline in total NAV, rather than in NAV per share, since the former incorporates the joint impact of both negative returns and investor redemptions.

In the aftermath of the failure of Lehman Brothers, many hedge funds, particularly the larger ones, had been asking for segregated accounts and restrictions on the re-hypothecation of their collateral in order to safeguard assets held with prime brokers. Concerns about prime brokers' credit standing and concentrations of counterparty risk had also led many hedge funds to establish multiple prime brokerage relationships and thereby contributed to substantial changes in prime brokerage market shares, of which some euro area LCBGs with large balance sheet capacity have been important beneficiaries.

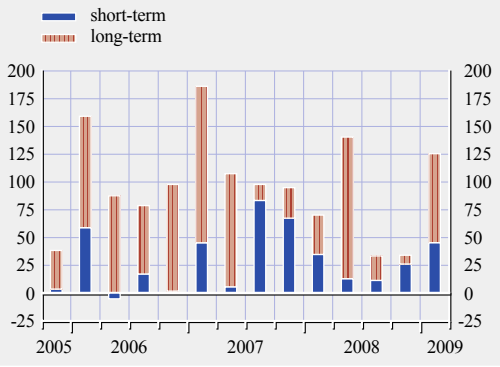
### FUNDING LIQUIDITY RISKS

Regarding banks' key funding markets, there have been some signs of improvement in euro area money market conditions since November 2008, as reflected in higher transaction volumes in unsecured interbank markets and a decline in recourse to the ECB deposit facility (see Section 3.1). Spreads between unsecured interbank deposit rates and overnight index swap rates have also declined markedly in major money markets since November.

Notwithstanding the signs of a slight improvement in euro area money market conditions, funding pressures for banks have remained intense. The maturity of interbank liabilities has shortened as a consequence of the limited availability of funds beyond one month in interbank markets and the reluctance of money market funds to invest in money market instruments with longer maturities. Furthermore, risk aversion and remaining concerns about counterparty risk have continued

**Chart 4.21 Net issuance of debt securities by euro area MFIs by maturity**

(Q4 2005 – Q1 2009; EUR billions)



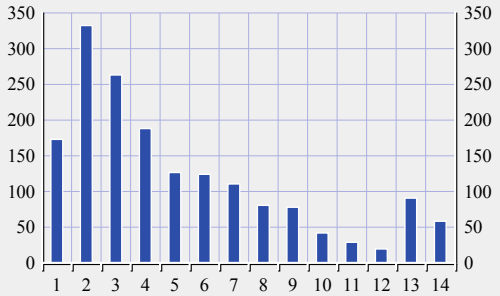

Source: ECB.

to impair access to interbank funding for some banks and, in turn, increased their dependence on central bank funding.

Looking at the other main components of banks' wholesale funding, the net issuance of debt securities by euro area MFIs has been reduced significantly in the aftermath of the default of Lehman Brothers. In the period between September 2008 and January 2009, net issuance of long-term debt securities by euro area MFIs was negative. Since February 2009 the issuance of long-term debt securities has recovered (see Chart 4.21), although this was predominantly due to issuance under government guarantee schemes. By late May 2009, euro area banks had issued €413 billion of bonds under government guarantees.

**Chart 4.22 Long-term debt of euro area large and complex banking groups by maturity date**

(EUR billions)




| | |
|---|---|
| 1 2009 | 8 2016 |
| 2 2010 | 9 2017 |
| 3 2011 | 10 2018 |
| 4 2012 | 11 2019 |
| 5 2013 | 12 2020 |
| 6 2014 | 13 after 2020 |
| 7 2015 | 14 perpetual |

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.

As regards other sources of medium and long-term funding such as covered bonds, the primary market for jumbo covered bonds had, encouragingly, begun to reopen in the first quarter of 2009. Furthermore, after the ECB announcement in early May 2009 on the programme to purchase euro-denominated covered bonds, primary issuance activity picked up markedly.[20] By late May 2009, according to data compiled by Dealogic, year-to-date issuance of covered bonds by euro area LCBGs was only 8% lower than in the corresponding period of last year.[21]

As regards euro area banks' refinancing needs in the period ahead, banks have large volumes of long-term debt that will need to be rolled over in the coming years. According to data compiled by Dealogic, in late May 2009 euro area LCBGs had more than €500 billion of existing long-term debt that will mature in the remainder of 2009 and in 2010 (see Chart 4.22).

Where other sources of wholesale funding are concerned, external liabilities of euro area MFIs, which to a large extent comprise deposits from foreign credit institutions, decreased sharply (by more than €500 billion) in the period from September 2008 to April 2009.

Banks' access to subordinated bond markets has remained hampered and the outlook for the issuance of subordinated debt has deteriorated even further in recent months, on account of

20 In the three weeks between the ECB announcement and the cut-off date for the FSR, euro area LCBGs have issued €14 billion of covered bonds.

21 These figures include both jumbo and non-jumbo covered bonds.

increased concerns about the nationalisation of banks. Reflecting these concerns, secondary market spreads on euro-denominated subordinated bonds have widened sharply, and peaked at around 950 basis points in late March 2009. Although spreads have gradually tightened since then, they remained at elevated levels in late May 2009.

Against the background of continued stresses in wholesale funding markets, banks have focused their funding strategies on increasing retail deposits, thereby trying to reduce customer funding gaps. In the period from September 2008 to April 2009, customer deposits (i.e. deposits from non-MFIs excluding governments) increased by around 6%, owing to significant growth in deposits from households and other financial institutions. In the same period, the customer funding gap of euro area MFIs was reduced by more than €500 billion and the funding gap ratio (defined as the ratio of the customer funding gap to customer loans) dropped significantly, from 13.5% in September 2008 to 8.7% in April 2009.

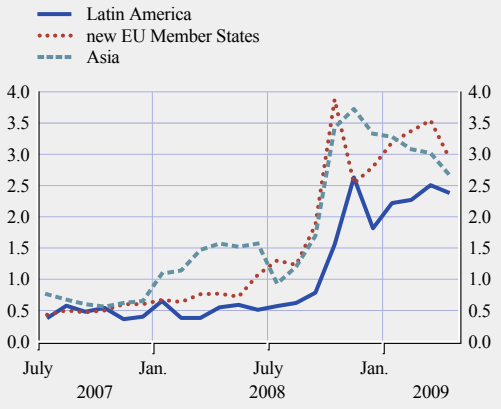
Banks' efforts to strengthen or maintain their deposit bases are also reflected in the development of deposit margins, at least on time deposits. While banks passed through central bank rate cuts to deposit rates in early 2009, the latter have decreased to a lesser extent than money market rates. As a consequence, the deposit margin of euro area MFIs was negative or close to zero in the first quarter of 2009. This may in part be the result of intense competition for retail deposits (see Chart S98).

## RISKS FROM EMERGING MARKETS AND THE NEW EU MEMBER STATES

Since the publication of the December 2008 FSR, macroeconomic conditions have worsened in Latin America, Asia and emerging Europe, as well as in several of the Member States that joined the EU in 2004 or later. GDP growth rates have slowed significantly and recent IMF estimates suggest that the annual output of emerging market economies and the new EU Member States will contract by 0.4% in 2009.

**Chart 4.23 Expected corporate default rates for different emerging market areas**

(July 2007 – Apr. 2009; percentage probability)



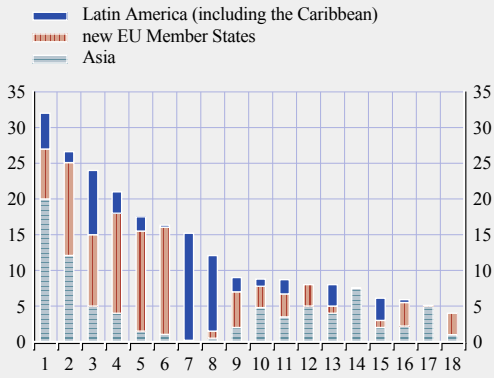

Sources: Moody's KMV.

At the same time, reliance by banks in these countries on external funding has increased further. Funding from abroad – either through markets or from parent banks – has become more scarce and more expensive in recent months. In some cases, banks have had to reduce their net foreign asset positions due to a lack of domestic funding. In addition, parent banks have come under increasing pressure from the global financial turmoil, as can be seen from, among other things, the development of their share prices.

Furthermore, many countries have seen their domestic currencies depreciate (for details, see Section 1.1). The banking sectors of some countries have also been affected by an erosion of domestic funding in the form of demand deposits. Although there is no evidence of a systematic deposit flight, many economies in central and eastern Europe (CEE) and in the Commonwealth of Independent States (CIS) have experienced deposit withdrawals since September 2008; there have, however, been some exceptions, with increases recorded. The widening gap between deposits and loans

**Chart 4.24 Loan exposures of euro area large and complex banking groups to emerging market economies and new EU Member States**

(2008; percentage of total assets)




Source: Individual institutions' financial reports.

**Table 4.1 Characteristics of euro area large and complex banking groups with large exposures to new EU Member States and emerging markets**

(Q4 2008; percentage)

| 2008 Q3 | Loans/ total assets | Deposits/ total assets | Equity/ total assets | Tier 1 capital ratio |
|---|---|---|---|---|
| Median LCBG euro area banks with large EME and NMS exposures | 33.8 | 24.7 | 2.8 | 9.4 |
| | 61.04 | 47.61 | 5.82 | 7.28 |

Sources: Individual institutions' financial reports and ECB calculations.
Note: The median LCBG excludes LCBGs with large exposures to emerging market and central, eastern and south-eastern European economies.

has forced banks to search for alternative and typically more expensive sources of funding.

These adverse conditions have been mirrored in considerably higher default expectations for firms (an increase from about 1% to above 2%), as well as for households in these regions (see Chart 4.23).

For some euro area LCBGs, a significant share of their assets (and their profits) is related to their activities in emerging market and CEE countries, exposing them to any further deterioration in the economic situation in those regions. Furthermore, given the higher profit margins that can be realised in the banking markets of new EU Member States, the contributions from subsidiaries in these countries to group profits can be substantial. Indeed, for the sample of LCBGs which are most active in this region, emerging markets accounted for between 4.5% and 37% of total assets and between 6% and 45.1% of total profits in 2008 (see Chart 4.24). This suggests that some banks active in the region could be negatively affected by a scenario in which macroeconomic conditions deteriorate sharply in these countries, causing higher delinquency rates and defaults on corporate and household loans.

The LCBGs active in the emerging market and CEE regions generally have high ratios of loans to total assets, funded largely through deposits. They also typically have Tier 1 ratios that are lower than the LCBG median (see Table 4.1). This largely reflects the banks' business models, which focus on low-risk-weight retail banking activities and rely on relatively large deposit bases.

**Box 15**

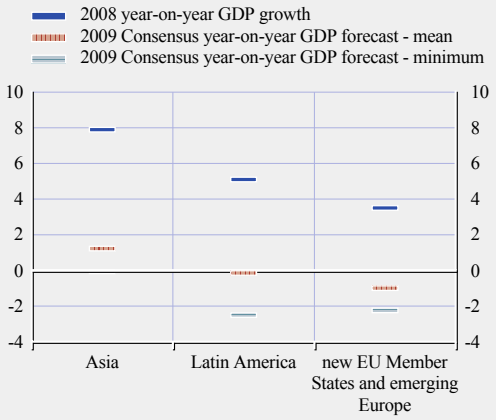
## ASSESSING THE RESILIENCE OF EURO AREA BANKS TO AN ADVERSE MACROECONOMIC SCENARIO IN THE NEW EU MEMBER STATES AND EMERGING MARKETS

Recent macro-financial developments in central and eastern Europe and emerging markets indicate that virtually all of them are being affected by the significant deterioration in global financial and economic conditions. Impacts on these countries have been heterogeneous, albeit severe in

some cases, reflecting significant differences in their domestic and external imbalances and therefore their vulnerability. The challenging macro-financial environment has meant that the banking sectors of new EU Member States and emerging market countries have come under increasing strain, predominantly as a result of a combination of two shocks.[1] First, external funding, on which many banking systems in these regions are reliant, became more scarce and expensive in 2008 and 2009; and second, the risk that non-performing loans will rise materially has increased on account of the economic slowdown and its repercussions for the debt servicing capacities of the corporate and household sectors. In some cases, this has already stretched balance sheets, not least owing to the balance-sheet effect of exchange rate depreciations. Against this background, this box analyses potential losses facing euro area banks should downside risks for the macroeconomic outlook of some new EU Member States and emerging market economies materialise.

**Chart A Consensus Economics GDP growth forecasts for 2009**

(2008 – 2009; percentage change per annum)




Source: Consensus Economics.

Potential losses facing euro area banks from lending activities in the new EU Member States and emerging market countries were estimated in three steps: first, by using the lower bound of Consensus Economics forecasts for GDP growth for these countries, as a proxy for the worst-case scenario; second, by empirically relating non-performing loans to GDP growth in the individual countries concerned, thereby allowing a projection of the potential increase in non-performing loans in 2009 to be computed on the basis of the worst-case macroeconomic scenario; and third, by combining these non-performing loan projections with information on what is known about the exposures of euro area large and complex banking groups (LCBGs) to these regions. Regarding the first step, contributors to Consensus Forecasts envisaged significant deterioration in major world regions in the first few months of 2009, with some expecting sizeable economic contractions (see Chart A).

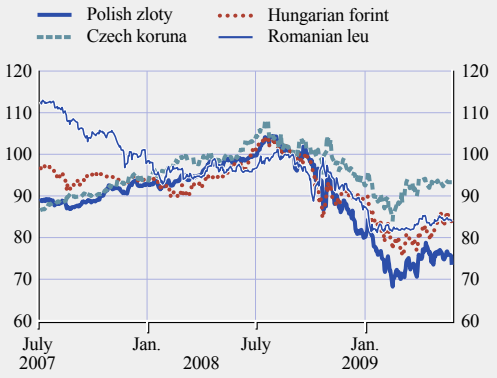
Non-performing loans were empirically linked to GDP in a bivariate vector auto-regression (VAR) framework, whereby the elasticity of non-performing loans to a one percentage point decrease in annual GDP growth was estimated to range between 0.5 and 0.6 for all geographic regions.[2] For the new EU Member States, the estimates were based on consolidated banking data on non-performing loans, while for Asian and Latin American exposures, non-performing loans were approximated with Credit-Edge+ expected default frequencies for the whole corporate sector. These simple projections indicate that non-performing loans could increase by between 7.5 and 10 percentage points, on average, for the whole region under study. These aggregate figures,

1 The strains in the banking sectors of new EU Member States and emerging market countries have not emerged uniformly across the region. Moreover, the delayed onset of these strains in some countries after the eruption of the turmoil in mature economy financial systems gave banks time to prepare by accumulating additional capital buffers and loan-loss provisions to protect themselves from shocks.

2 This framework does not take into account the asymmetries which may exist between new EU Member States and emerging market countries.

**Chart B Change in four central and eastern European countries' currencies against the euro**

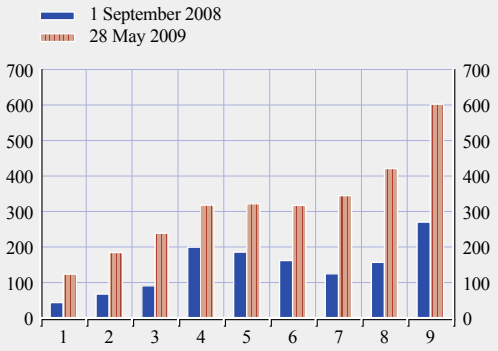
(July 2007 – May 2009; index: Sep. 2008 = 100)




Source: Bloomberg.

**Chart C Sovereign CDSs in central and eastern European countries**

(basis points)




1 Czech Republic
2 Poland
3 Croatia
4 Romania
5 Bulgaria
6 Estonia
7 Hungary
8 Lithuania
9 Latvia

Source: Bloomberg.
Note: The Estonian sovereign CDS is a purely synthetic instrument without any underlying asset.

however, mask important differences across countries, notably in the new EU Member States. Finally, loan losses were computed from the information given by LCBGs in their annual reports on exposures to the new EU Member States, Asia and Latin America.

The findings from this simple exercise, which has a number of caveats, shows that if the worst-case macroeconomic scenario were to materialise in 2009 in the new EU Member States, Asia and South America, the losses that euro area LCBGs would have to absorb collectively would amount to slightly more than 7% of their Tier 1 capital.[3] Although this finding suggests that the balance sheets of LCBGs, would not be unduly strained by such a scenario, there are important differences across LCBGs, and some of them could see their Tier 1 capital shrink by as much as a third under such a scenario. Moreover, for those institutions facing losses on other business lines, the combined effect could pose important challenges. That said, three mitigating risk factors have to be taken into account: first, most euro area LCBGs would be hardly affected by a more severe than currently expected economic downturn in all of these regions; second, as shown by the BIS banking statistics for the fourth quarter 2008, foreign banks remained committed to central and eastern European countries; and, third, public sector funding from the EU and the IMF had been seen by the markets as making an important contribution to lowering the risks in these regions.

Potential losses for euro area banks from lending to emerging market countries and the new EU Member States could be aggravated further if financial market conditions in those countries were to continue to deteriorate. In particular, after the collapse of Lehman Brothers, a sharp rise in global risk aversion triggered significant outflows from some emerging economies, including new EU

3 This figure takes full account of loan-loss reserves, but it is based on an assumption that there were no retained profits in 2008 to cover any losses that might be incurred on loans extended in 2009. The expected loss amounts were based on an assumption that the recovery rate would be 30%. This recovery rate is somewhat higher than the assumptions in private sector reports. For the latter, see Morgan Stanley, "Emerging Euro – Banks: Making the 97/98 Asian Crisis Our Base Case", March 2009 and JPMorgan Chase & Co., "European Banks: Absorbing CEE stress, crunching numbers", March 2009.

Member States. One consequence of this was large depreciations in the currencies of several of the new EU Member States (see Chart B) and a fall in market liquidity. However, in countries with currency board arrangements, which also had large foreign currency exposures, the foreign exchange market pressures were reflected in changes in foreign exchange reserves and domestic interest rates, rather than in the exchange rates. That said, since the beginning of 2009, there has been more differentiation in foreign exchange rate patterns, although global risk aversion remains a dominant factor. Generally, the countries perceived as being most vulnerable to the challenges of the macro-financial environment – i.e. those with banking systems that are strongly reliant on foreign funding and/or have a large share of foreign currency lending – have faced the greatest foreign exchange rate pressures, although there are some exceptions. In some countries, the high share of foreign currency-denominated loans exacerbated the risk to the real economy of sharp local currency movements, as borrowers face a relative increase in the amount of their debt.

This could, in turn, lead to an aggravation of the economic downturn in central and eastern Europe, as some western banks with local subsidiaries may endeavour to reduce their risk exposure to the region. Fears of such negative feedback loops between the financial and economic spheres in the new EU Members States and other emerging economies have contributed to a significant increase in perceived sovereign risk in the region (see Chart C).

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

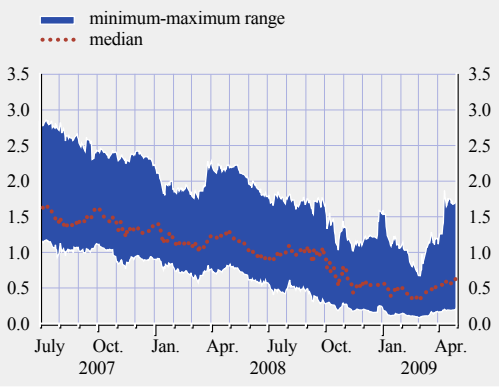
Since the finalisation of the December 2008 FSR, market-based indicators have continued to point to increasing risks for LCBGs. This can be attributed mainly to the uncertainty surrounding the depth and length of the global economic downturn, which could continue to negatively affect the credit quality of banks' borrowers. Adding to the uncertainty surrounding financial institutions has been some concern about the efficiency of government support programmes. Moreover, equity holders reacted negatively to the prospect of a dilution of their shares following public capital injections. A non-negligible possibility of some banks ultimately being nationalised forced banks' CDS spreads to increase further, reflecting the fact that nationalisation is considered a credit event in standard CDS contracts.[22] For these reasons, market-based indicators should be interpreted with particular caution at present. That said, LCBGs' equity prices have already decreased significantly, and in late 2008 they fell below the levels seen in 2003 (see Chart S110). Moreover, implied volatility on LCBGs' share prices has increased to historically high levels (see Chart S111).

As discussed in Section 4.1, uncertainties surrounding the future of euro area banks have also been reflected in price-to-book value ratios, which reached record low levels in the first quarter of 2009 and were three times lower than before the market turmoil erupted in 2007 (see Chart 4.25). As it measures the

22 According to the International Swaps and Derivatives Association master agreement, which serves as a standard for the majority of CDS transactions, nationalisation is a credit event.

**Chart 4.25 Dispersion of price-to-book value ratios for euro area large and complex banking groups**

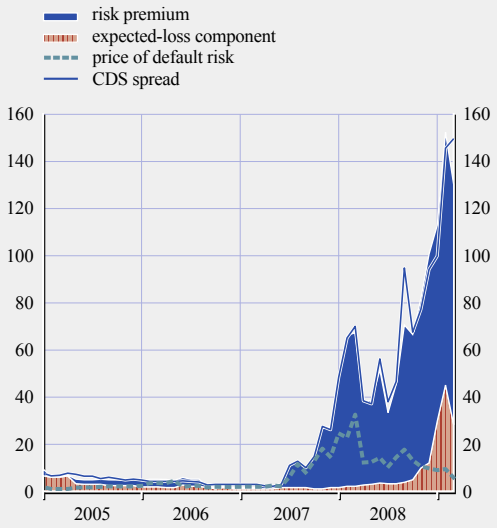
(July 2007 – May 2009)




Sources: Bloomberg and ECB calculations.

**Chart 4.26 Decomposition of the CDS spreads of euro area large and complex banking groups**

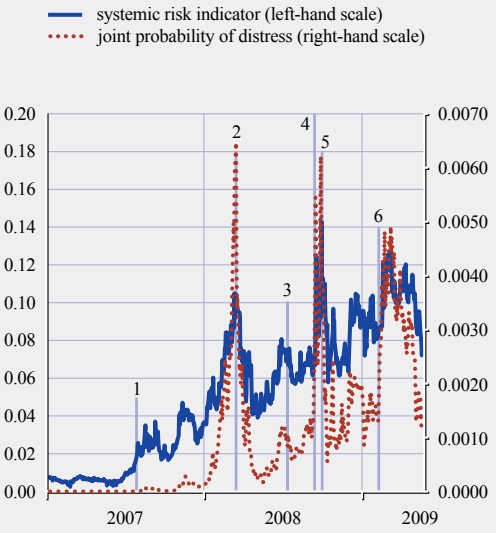
(Jan. 2005 – Mar. 2009; basis points)




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 sum 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.

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

(Jan. 2007 – May. 2009; probability)




1 Turmoil begins
2 Bear Stearns rescue takeover
3 Rescue plan for US Fannie Mae and Freddie Mac announced
4 Lehman Brothers default
5 US Senate approves Panlson plan
6 T. Geithner announces Financial Stability Plan

Sources: Bloomberg and ECB calculations.
Note: See 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 and 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.

market value of equity capital relative to its book value, this ratio reflects a firm's solvency prospects. Additional capital injections and the fall in equity prices were seen as the main reasons behind the significant decrease in the market value of euro area banks' capital. Nevertheless, the median of this indicator seems to have stabilised at a low level in early 2009 and then picked up somewhat in April, which may be an indication that, following the gradual introduction of guarantee schemes, the prospects of the benefiting banks are no longer deteriorating in the view of market participants.

Uncertainty about the severity of the credit cycle downturn and its adverse impact on banks' shock-absorption capacities have also become apparent in the CDS spreads of euro area LCBGs, which reached new record highs in March 2009, exceeding levels seen in the aftermath of the default by Lehman Brothers (see Chart S108). The cost of protection against banks defaulting continued to increase in spite of government support measures. It is important to note that this does not necessarily reflect a lack of trust among market participants in the effectiveness of government support; it could also mirror the fear that problems at some institutions may yet force governments to nationalise them.

A decomposition of CDS spreads tends to support this hypothesis, as it suggests that the expected-loss component, which represents the pure default risk, has more than doubled since the third quarter of 2008 (see Chart 4.26). By contrast, the

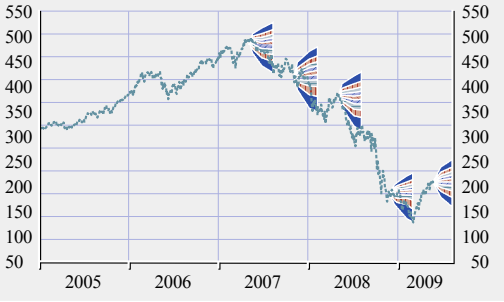
price of default risk, which is a measure of the compensation that protection sellers demand for bearing this risk, decreased after the Lehman default in September 2008. This means that by end-March 2009, the expected-loss component was a major contributor to the further increase in CDS spreads, whereas the relative importance of the default risk premium had decreased.

Against this background, the joint probability of distress and the systemic risk indicator for the euro area banking sector reached their local highs in early April 2009 (see Chart 4.27). Recent developments in these indicators have to be interpreted with caution, however. Since banks' CDS spreads are an important input in calculation of both indicators, the sharp increase in the indicators in mid-April may have been related to growing fears of bank nationalisations among market participants. Such perceptions, which may have been intensified by the above-mentioned terms of CDS contracts, can be considered somewhat irrational if the aim of a bank nationalisation is to protect bondholders and mitigate the risk of systemic failures. All in all, against the background of the substantial efforts made by public authorities to support the euro area banking sector, systemic risk can be considered to have decreased materially, although this might not be fully evident from the systemic risk indicators. Nevertheless, both indicators decreased significantly in May 2009.

Distance-to-default, an equity-based yardstick of credit risk, also signals increasing default risk among euro area LCBGs. This indicator has decreased substantially over the last six months, and has dropped below the levels seen in 2002-03, when the banking sector faced challenging conditions in the aftermath of the equity market correction (see Chart S107). Increasing default risk is also reflected in the surge in expected default frequencies (EDFs) for euro area LCBGs, which recently exceeded the peak levels seen during the last downturn (see Chart S106). All in all, both indicators suggest that market participants do not rule out further losses in the banking sector and have concerns about LCBGs' shock-absorption capacities in spite of substantial support extended by the euro area governments.

**Chart 4.28 Option-implied risk-neutral density bands for the Dow Jones EURO STOXX bank index**

(Jan. 2005 – June 2009; index value; 10%, 30%, 50%, 70% and 90% confidence intervals of estimations on 11 May 2007, 8 Nov. 2007, 6 May 2008, 27 Nov. 2008 and 28 May 2009)




Sources: Bloomberg and ECB calculations.

In spite of growing risks as conveyed by default risk indicators, by end-May other indicators suggested that the short-term outlook for euro area LCBGs had slightly improved. Strong negative skewness in option-implied risk-neutral density functions, which had constantly been observed since the beginning of the financial market turmoil, has recently become much less profound. This suggests that options market participants may consider further losses on LCBGs' share prices to be less likely in the short run, possibly because many such institutions have seen their share prices decline below their intrinsic values (see Chart 4.28). Moreover, the confidence bands derived from options quotes narrowed slightly in May 2009, which suggests that large moves in the market prices had become less likely. The highest confidence intervals were even skewed upwards, which suggests that a higher probability to upward versus downward movements in euro area bank stock prices is assigned under the risk-neutral probability measure.

All in all, despite the tentative signs of near-term stabilisation indicated by the option-based indicators, other forward-looking indicators signal that the outlook for the euro area banking sector has worsened. In particular, despite the

public support measures implemented thus far, the outlook for euro area LCBGs remains uncertain and protracted challenging market conditions may exert further pressure on these institutions in the period ahead.

### DEVELOPMENTS IN EURO AREA BANKS' CREDIT RATINGS

The, on average, still relatively high credit ratings reported for euro area LCBGs in the December 2008 FSR subsequently came under considerable downward pressure. This reflects the fact that LCBGs have continued to face an exceptionally difficult environment owing to the confluence of falling asset valuations, reduced market liquidity, varying levels of capital strains and extremely low investor and client confidence. The average rating for the group remained at the AA- level, but rounding effects mask the continuation of the deteriorating trend observed since the beginning of 2008. The downward trend in ratings is expected to continue, as rating outlooks – considered a medium-term indicator of the potential direction of longer-term credit ratings (beyond one to two years) – show a clear negative path for the future.

## 4.4 OVERALL ASSESSMENT

The financial results reported for the last quarter of 2008 showed that for many LCBGs, financial conditions deteriorated sharply towards the end of the year. In 2009 support from the ECB and the euro area governments has continued to play an important role at a time when LCBGs' earnings have remained under intense pressure.

The outlook for the euro area LCBGs remains uncertain. There are indications that the actions taken by banks to reduce exposures, control costs and bolster solvency ratios – in many cases with government support – as well as the favourable trading environment in the first months of 2009 may have helped many of these institutions to stabilise their financial positions. At the same time, the deterioration in the euro area and global macroeconomic environment is exerting pressure on corporate and household finances and insolvencies are expected to increase in the course of 2009. This will force many LCBGs to report growing impairment costs and loan losses, thus denting the earnings prospects of even those banks which have been less affected by securities write-downs.

Even if the more recent signs suggest a slowdown in the pace of deterioration in the economic environment, no substantial improvement in financial institutions' operating environment can be expected in the remainder of 2009. Against this background, financial institutions should intensify efforts to hedge their existing securities exposures and re-assess credit risks at a higher frequency than in "normal" times. Banks could also benefit from improving expertise in the area of debt restructuring processes and ensure that risks are priced appropriately but not excessively or prohibitively so.

The scarcity of medium and longer-term funding liquidity remains a key problem for the LCBGs. The decisions by the ECB and other major central banks to further increase the provision of liquidity have mitigated the problems at the short end of the money market maturity spectrum, but the cost of, and access to, longer-term financing remains problematic for many LCBGs. Since the beginning of the turmoil, LCBGs have been partially compensating for the low money market liquidity by actively increasing their deposit bases. While the efforts to this end should be continued, banks should also consider reallocating their business away from activities that are particularly dependent on the availability of unsecured funding.

An important contribution to the pursuit of stable or higher capital ratios among LCBGs is likely to come from the reduced growth rate of risk-weighted assets. There will probably also be further efforts to trim costs, and pressure for consolidation is likely to intensify. These developments, although necessary to bring the banking sector back to a state where stable earnings and organic capital growth are restored, might have substantial medium-term implications for the market structure

and competitive environment in the euro area banking sector. At the same time, public sector support measures will continue to provide relief to banks on stresses on both the asset and liability sides. Looking forward, to safeguard against further unexpected losses, governments and supervisors should encourage banks to take advantage of the existing public sector commitments for financial support. At the same time, the scale and scope of these support programmes should be assessed through system-wide stress testing, while supervisors should require full transparency regarding banks' exposures to hard-to-value securities.

The main risks currently faced by the euro area LCBGs can be summarised as follows.

- ⬆ A slowdown in earnings and increase in credit costs as a result of the sharper than previously expected global economic downturn
- ➡ Further write-downs on asset-backed securities, including those with European loans in collateral pools
- ➡ Erosion of capital bases and a resulting loss of confidence in future solvency positions
- ⬇ Competitive pressures in the retail lending market and tight bid-ask spreads in the retail financial markets

⬆ *Increased since the December 2008 FSR*
➡ *Unchanged since the December 2008 FSR*
⬇ *Decreased since the December 2008 FSR*

## 5 THE EURO AREA INSURANCE SECTOR

*The condition of and outlook for the euro area insurance sector deteriorated after the finalisation of the December 2008 Financial Stability Review (FSR). Financial performances weakened, with the risks and challenges facing the sector increasing and continuing to materialise. In particular, the financial market turbulence and the slowdown of economic activity created further challenges for many insurers and could continue to do so. This notwithstanding, available information on the solvency positions of euro area insurers suggests that, on average, they have sufficient remaining shock-absorption capacity to weather the materialisation of the risks they currently face. Nevertheless, insurers and insurance supervisors need to be vigilant in handling the risks facing the insurance sector and should take appropriate action to manage them. For insurers, this could include reducing large investment exposures, for example by hedging, and careful consideration of whether share buyback programmes and dividend payouts should be maintained. A greater transparency of investment exposures and the accounting methods used is also needed and should be promoted by insurance supervisors.*

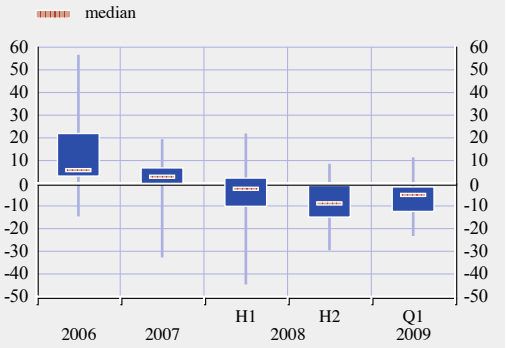
### 5.1 FINANCIAL CONDITION OF LARGE PRIMARY INSURERS AND REINSURERS

#### FINANCIAL PERFORMANCE OF LARGE PRIMARY INSURERS[1]

The financial performance of large euro area primary insurers deteriorated in the second half of 2008 and the first quarter of 2009, and most insurers reported continuous reductions in premiums written during this period (see Chart 5.1). Falling asset prices in equity and credit markets reduced demand for life insurance products, in particular unit-linked products – where the investment risk is borne by the policy-holder – and contributed to lowering premiums written. Insurers (mainly life insurers) also saw higher lapse rates – where the policy-holder fails to pay the premium – and surrender rates – where the policy-holder cancels a policy, often incurring penalty costs. Non-life premium growth for some insurers was hampered by the deteriorating economic environment, which lowered demand for insurance products from both households and firms.

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

(2006 – Q1 2009; percentage change per annum; maximum, minimum and interquartile distribution)




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

Insurers' financial performance was also negatively affected by above-average insurance losses from catastrophic events in the second half of 2008 and increased expenses. Nevertheless, combined ratios still remained below 100% (a combined ratio of more than 100% indicates an underwriting loss for the insurer) for all of the primary insurers considered (see Chart S117).

Investment income of insurers continued to be adversely affected by falling asset prices, especially of structured credit products, corporate bonds and equities in the second half of 2008. However, most insurers managed to avoid outright investment losses, and investment income in the first quarter of 2009 improved somewhat for those insurers who report their results on a quarterly basis (see Chart 5.2).

1 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 total euro area insurance sector. However, at the time of writing, not all figures were available for all companies.

Poorer underwriting performance and lower investment income caused a broad-based reduction in the profitability of primary insurers. The median return on equity declined to 2.8% in the second half of 2008 and to 0.4% in the first quarter of 2009, from 12.3% in the first half of 2008 (see Chart 5.2). Moreover, around half of them reported overall losses in the first quarter of 2009.

As mentioned in past issues of the FSR, euro area insurers' exposures to structured credit products were significant in some cases, and many insurers continued to report write-downs on such investments in the second half of 2008. However, thanks to generally limited exposures to products referencing US sub-prime mortgages, euro area insurers avoided write-downs of the magnitude reported by many other financial institutions.

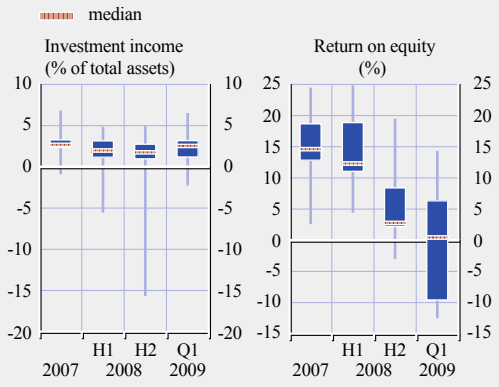
Notwithstanding the limited write-downs so far, it should be noted that investment asset write-downs may be reported with a delay in insurers' profit and loss accounts. This is because, in general, insurers' securities holdings are classified mainly as "available for sale" and are thus recorded at fair value on their balance sheets, with any recorded losses leading to commensurate movements in shareholders' equity. As a result of this, the value of shareholders' equity in large euro area primary insurers declined by some 17% on average during 2008. However, no loss is recorded in the profit and loss account for "available for sale" assets unless it is considered to be an impairment that is other than temporary.[2]

Many insurers that report in accordance with the International Financial Reporting Standards (IFRSs) have, however, imposed a policy on themselves that triggers impairments when the value of their equity investment falls significantly below the acquisition cost (often 20%), or remains below the acquisition cost for longer than a certain predefined period (of, typically, six to twelve months). For credit investment, a charge against earnings is taken when there is a delay in the payment of interest or principal. As a result thereof, some investment losses were reported in the profit and loss accounts for 2008, for some equity assets considered "available for sale", but losses reported on credit exposures were more limited.

It should be noted that life insurers also hold investments on behalf of policy-holders that have bought unit-linked insurance products, for instance. Declining asset values have therefore led to reductions in insurers' deferred policy-holder liabilities, but this has not directly affected insurers' financial performances.

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

(2007 – Q1 2009; maximum, minimum and interquartile distribution)




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

## FINANCIAL PERFORMANCE OF MAJOR REINSURERS[3]

The second half of 2008 was a challenging period for euro area reinsurers as investment income declined and an above-average occurrence of catastrophes contributed to weaker financial results.

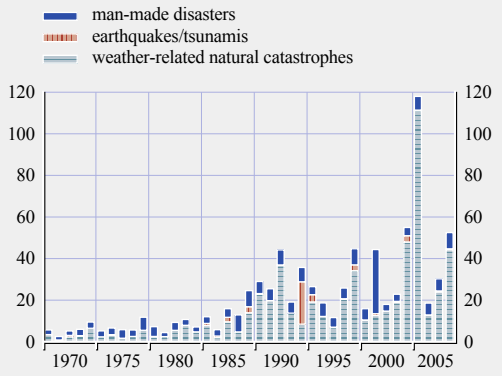
Underwriting income was affected by some major catastrophes in 2008, such as Hurricane

2 This differs from the practices of banks, which generally account for most securities "at fair value through profit and loss", which means that the assets are marked-to-market through the profit and loss account.

3 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.

**Chart 5.3 Insured losses from natural catastrophes and man-made disasters throughout the world**

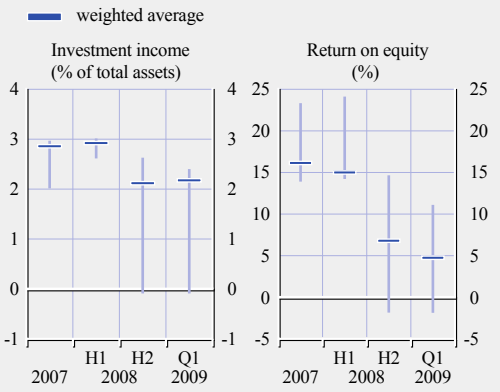
(1970 - 2008; USD billions)




Source: Swiss Re.

**Chart 5.5 Distribution of investment income and return on equity for a sample of large euro area reinsurers**

(2007 – Q1 2009; maximum-minimum distribution)



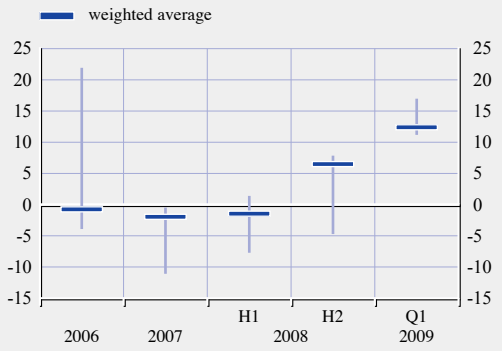

Sources: Bloomberg, individual institutions' financial reports and ECB calculations.

Ike in the United States and some windstorms in Europe. Natural catastrophes and man-made disasters caused 240,500 fatalities and resulted in insured losses of USD 52 billion, which made 2008 one of the costliest years in history for reinsurers (see Chart 5.3). This contributed to higher loss ratios and combined ratios of very close to 100% for all euro area reinsurers (see Chart S120).

Reinsurers did, however, benefit from the financial challenges facing some primary insurers as demand for reinsurance increased when primary insurers attempted to improve their solvency positions. The relatively large amounts of insured losses absorbed by some primary insurers as a result of catastrophes during 2008 also increased the demand for reinsurance. On average, euro area reinsurers reported increases in gross premiums written in the second half of 2008 and the first quarter of 2009 (see Chart 5.4).

**Chart 5.4 Distribution of gross-premium-written growth for a sample of large euro area reinsurers**

(2006 – Q1 2009; percentage change per annum; maximum-minimum distribution)




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

The increased demand for reinsurance also led to reinsurance prices increasing by about 8% on average during the January 2009 renewals.[4] Some market participants expect further reinsurance price increases in the June renewals, by around 5% on average.[5]

Reinsurers' investment income in the second half of 2008 and the first quarter of 2009 was lower than previously (see Chart 5.5). The lower underwriting and investment income resulted in broad-based declines in the return on equity, which declined, on average, to 6.7% in the second half of 2008 and to 4.7% in the first

4 See Guy Carpenter, "Reinsurance Market Review 2009", March 2009.

5 See Aon Benfield, "Reinsurance Market Outlook", January 2009.

quarter of 2009, from 15.0% in the first half of 2008 (see Chart 5.5).

### SOLVENCY POSITIONS OF LARGE PRIMARY INSURERS AND REINSURERS

The deteriorating financial performance of primary insurers and reinsurers in the second half of 2008 and the first quarter of 2009 affected their solvency positions. However, actions taken by insurers to bolster their capital and unrealised gains owing to lower government bond yields appear, on average, to have left primary insurers' capital positions only slightly reduced in the second half of 2008, and those of some insurers even improved in the first quarter of 2009. Reinsurers' solvency positions remained broadly stable in the second half of 2008 and in the first quarter of 2009. There were, however, significant differences across insurers (see Chart 5.6).

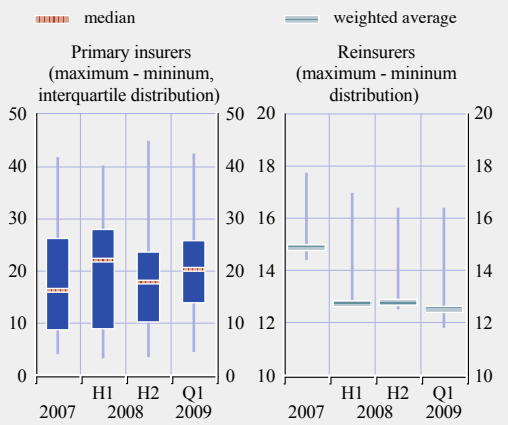
Some insurers received capital injections from governments to bolster their solvency and many continued to hedge equity and credit exposures to conserve capital, while some carried out significant outright sales of equities. Some also tried to preserve their capital positions by reducing dividends, with some cutting them to zero.

Solvency positions were negatively affected by slowdown in insurance-linked securitisation in 2008. This slowdown was most pronounced in life insurance securitisations as these transactions often involved a "monoline" financial guarantor as the seller of protection. The troubles confronting financial guarantors caused them to withdraw from this business. Issuance of non-life insurance-linked securities (mainly catastrophe bonds, which had held up relatively well in the first half of 2008) also came to a halt in the second half of the year, owing to the financial turmoil and the above-average occurrence of catastrophic events.

All in all, solvency positions in the first quarter of 2009 appeared, on average, to provide sufficient shock-absorption capacity relative to regulatory requirements. This is also because insurers often keep their capital levels above regulatory requirements so as to obtain a certain 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 practices and levels of disclosure. In addition, insurers are currently facing considerable risks that could, should they materialise, quickly reduce solvency positions significantly.

**Chart 5.6 Distribution of capital positions for a sample of large euro area primary insurers and reinsurers**

(2007 – Q1 2009; percentage of total assets)




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

## 5.2 RISKS CONFRONTING THE INSURANCE SECTOR

The most significant risks that euro area insurers currently face include, in no particular order:

- financial market/investment risks;
- risks associated with a deteriorating macro-financial environment;
- longevity risks;
- the risk of losses from catastrophic events exceeding projected losses;

- contagion risks from banking activities or from ownership links to banks and other financial institutions; and

- strong competition in some segments, together with a strong focus on creating shareholder value.

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, should they occur, significantly impair the solvency of insurers.

## FINANCIAL MARKET/INVESTMENT RISKS

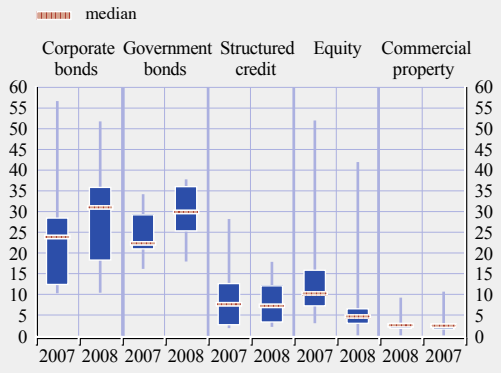
As past issues of the FSR have highlighted, financial market and other investment risks are some of the most prominent types of risk that insurers are confronted with. Owing to the continued turbulence in the financial markets after the finalisation of the December 2008 FSR, the related risks for insurers have persisted or even increased in some cases, and they have continued to materialise as many insurers have reported reduced investment income or investment losses in recent quarters (see Section 5.1). At the same time, increased asset correlation has reduced the benefits of insurers' often diversified investment portfolios.

The investment exposure of euro area insurers is largest vis-à-vis corporate and government bonds (on average, about 60% of their total investment portfolios in 2008 for a sample of large insurers; see Chart 5.7). At the end of 2008, on average, large euro area insurers had about 53% of their bond holdings in corporate bonds and 47% in government bonds, although these shares varied significantly across companies (see Chart 5.7). In addition, many insurers also have material investment exposures to structured credit products (see Chart 5.7).

Insurers' ability to hold investments until maturity (to back their long-term liabilities) means that the key risks facing insurers from debt security exposures are not temporary losses in value – unless they are forced to sell assets – but defaults. Nevertheless, downgrades of the ratings of bonds and structured credit products could force insurers to reduce their holdings or recognise impairments, which would further affect their results and capital positions.

**Chart 5.7 Distribution of bond, structured credit, equity and commercial property investment for a sample of large euro area insurers**

(2007 – 2008; percentage of total investments; maximum, minimum and interquartile distribution)




Sources: Individual institutions' financial reports and ECB calculations.

Conditions in corporate bond markets deteriorated after the finalisation of the December 2008 FSR (see Section 3.2), mainly as a result of the deteriorating macroeconomic environment (see Section 2.1). At the same time, large euro area insurers increased their investment exposure to corporate bonds in 2008 – not only in absolute amounts, but also as a share of total investment, which left them more vulnerable to adverse developments in corporate debt markets. The rise in yields on corporate bond and structured credit products have led to large unrealised losses in many insurers' "available for sale" bond portfolios. Insurers may have to sell such securities and realise losses if the ratings of the securities they hold are downgraded (as some insurers are only allowed to hold securities with certain ratings) or in the event of liquidity shortages (see also Box 16). In addition, realised losses for insurers are likely to increase as corporate bond default rates are expected to rise in the period ahead (see Section 2.2). It should be noted, however, that insurers have mainly invested in

investment grade corporate bonds and structured credit products and exposures to speculative grade-rated securities are generally low.

In addition to exposures to commercial mortgage-backed securities (included in "structured credit" in Chart 5.7), insurers sometimes have significant exposures to commercial property markets, via direct investment in property (see Chart 5.7) or investment in property funds. Conditions in many euro area commercial property markets have deteriorated, and potentially worse economic conditions are likely to weaken some commercial property markets further (see Section 2.3). This could, in turn, negatively affect insurers' commercial property investment.

Insurers also continue to face the risk of government bond yields remaining at low levels. This is a particular concern for life insurers that have a large stock of guaranteed-return contracts. Euro area insurers have increased their exposures to government bonds since the financial crisis erupted (see Chart 5.7). Government bond yields in the euro area have, however, increased by some 50 basis points since November 2008, which has helped to somewhat lower this risk for insurers.

Insurers' equity exposures are generally lower than their exposures to bonds and other fixed income securities (see Chart 5.7). Falling equity prices in recent quarters have, however, resulted in equity investment losses for many insurers. Amid the continued uncertainty prevailing in equity markets (see Sections 1.2 and 3.2), further losses cannot be excluded. However, many insurers have significantly reduced or hedged equity exposures over the past year, which has helped to reduce some of the equity investment risk (see Chart 5.7).

Insurers are also facing financial market liquidity risks as a result of the currently reduced liquidity in some of the markets for the assets they hold. An insurer that needs to sell assets to raise cash might therefore face difficulties (see also Box 16).

Box 16

## ASSESSING THE LIQUIDITY RISKS OF INSURERS

Liquidity risk has caused problems and even insolvencies in the financial services industry in the past and it remains a key risk for financial institutions to manage in the future. Liquidity risk can be defined as the risk that cash resources are insufficient to meet cash needs either under current conditions or in stress scenarios.[1] This box describes some of the key liquidity risks that can confront insurers and presents some liquid asset measures.[2]

Insurers can be confronted with both asset and liability liquidity risks. As regards liability-side liquidity risks, insurers, 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 in general less liquid than bank deposits, as the possibilities for savings withdrawals are restricted in most insurance contracts and are also more costly for customers (owing to tax and surrender penalties). That said, liability-side liquidity risks still exist for insurers. For example, life insurers, in particular, face the risk of simultaneous withdrawals or policy surrenders by policy-holders.

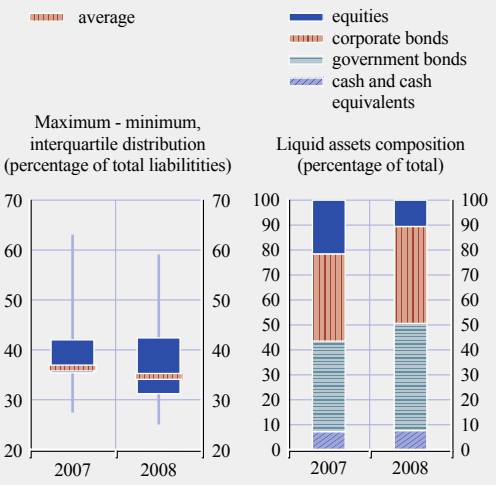
1 See Chief Risk Officer Forum, "Liquidity Risk Management", October 2008.
2 The focus of this box is on liquidity risks for the account of an insurer. Liquidity risk can, however, also exist for the account of policy-holders, where the policy-holder bears the investment risk.

This risk could, for example, be triggered if policy-holders have reason to question the financial soundness of the insurer. Non-life insurers can experience liquidity shortages as a consequence of large natural or man-made catastrophes, leading to large claims that have to be paid over a short period of time.

Turning to asset-side liquidity risks, insurers face the risk of impaired liquidity in capital markets. When previously liquid asset classes become illiquid, raising cash can prove to be difficult and may force insurers to sell their most liquid assets even though they may have preferred to keep them. It is therefore important for insurers to have assets backing liabilities that are able to provide enough cash to cover all needs, under both normal and stress conditions.

**Distribution and composition of liquid assets for a sample of large euro area insurers**

(2007 – 2008)




Sources: Individual institutions' financial reports and ECB calculations.
Note: Liquid assets are the sum of cash, deposits, corporate and government bonds and equities.

Liquidity shortages can also occur if an insurance company's credit rating is downgraded by a rating agency. Insurers have often agreed to retire parts of their financing, or to post new collateral against trading positions, in the event of a rating downgrade. A rating downgrade can therefore cause liquidity shortages.[3] In such a scenario, the initial rating downgrade may be followed by additional rating changes as a result of the liquidity problems. A recent prominent example of this is to be found in the problems experienced by the American insurer AIG. AIG made losses on credit default swaps, in particular. These losses and the deteriorating outlook for the insurer led to rating downgrades in September 2008, which forced it to post collateral payments on derivatives trades. AIG was unable to raise enough capital to satisfy demands for collateral quickly enough, which resulted in the insurer receiving government support. Given the importance of credit ratings for insurers, rating actions and rating outlooks should be monitored to assess the possibility of liquidity risk arising from rating downgrades (see Section 5.3).

Insurers that offer banking services or insurers that are part of a financial conglomerate can face particular liquidity risks. An insurance entity might be called upon to provide intra-group transfers of liquidity to an ailing banking entity, as has happened during the current financial crisis.

For financial stability and supervision purposes, it is important to analyse the different types of liquidity risk confronting insurers, as well as insurers' liquidity positions. Calculating liquidity positions, however, is difficult without access to internal data from insurance companies. Nonetheless, some rudimentary indicators can be constructed on the basis of disclosures made by insurers in their financial reports. For example, the ratio of liquid assets to liabilities and the composition of liquid assets provide a broad overview of the liquidity positions of insurers

3 See, for example, Standard and Poor's, "Evaluating Liquidity Triggers in Insurance Enterprises", November 2008.

(see chart). For a sample of large euro area insurers, this liquid assets indicator decreased somewhat, on average, from 2007 to 2008 (see chart). Corporate and government bonds accounted for the largest share of liquid assets, and the shares increased in 2008 (see chart). Government bonds can generally be considered to be more liquid than corporate bonds. Insurers' corporate bond investments, however, are predominantly in the investment grade-rated segment, which is usually more liquid.

The amount of cash held by insurers increased slightly, on average, from 2007 to 2008, but the average figure conceals the disparity between insurers. Some insurers increased their cash holdings significantly (by up to 78%), whereas others saw their cash buffers reduced notably (by up to 71%).

To sum up, for financial stability and supervision purposes, it is important to analyse insurers' liquidity positions against liability structures and potential liquidity calls to assess how well-positioned insurers are to handle stress scenarios. At the same time, it is important for insurers to manage and monitor liquidity risks (stemming from both the asset and liability sides) adequately and to have sufficient liquidity buffers available.

## RISKS ASSOCIATED WITH A DETERIORATING MACRO-FINANCIAL ENVIRONMENT

A further risk for which the likelihood of materialisation has continued to increase since the finalisation of the December 2008 FSR is the risk associated with the slowdown in the macro-financial environment (see Sections 1 and 2). There are four main ways in which this could affect insurers negatively. First, insurance underwriting is usually supported by a favourable economic environment.[6] Owing to the deteriorating outlook for economic activity, the – in the view of market participants – rather optimistic earnings outlook for insurers for the remainder of 2009 may have to be revised downwards in the period ahead (see Chart 5.8).

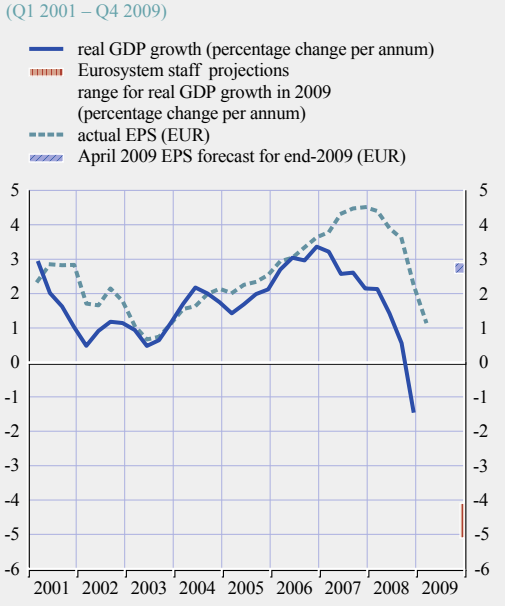
Second, in addition to lower new premiums written, the deteriorating macroeconomic environment is reducing the disposable income of many households. This can lead to higher lapse and surrender rates, in particular for life insurers, as lower disposable income for households can lead to a situation where they are unable to pay premiums, so that they may surrender policies.

Third, insurers currently face higher credit risks as conditions in the corporate sector are likely to deteriorate on account of the weaker economic conditions, which could result in losses on insurers' investments in corporate bonds and loans, structured credit products and different

6 See Box 13 in ECB, *Financial Stability Review,* December 2008, for an analysis of the insurance underwriting cycle in the euro area.

**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 2009)




Sources: ECB, Thomson Financial Datastream and ECB calculations.

types of commercial property investment (see the sub-section above).

Fourth, some (mainly life) insurers also extend loans to households and firms, so that they would be exposed to greater credit risks if credit market conditions in these sectors were to deteriorate.

### LONGEVITY RISKS

Life insurers and reinsurers continue to face the risks posed by increasing life expectancy, known as longevity risk. This can lead to reserve deficiencies in insurers' annuity books and may result in profitability being overstated. It may also induce insurers to take greater risks in their investment activities.

### THE RISK OF LOSSES FROM A CATASTROPHIC EVENT EXCEEDING PROJECTED LOSSES

For reinsurers and non-life insurers, one of the most prominent risks remains the potential for losses from catastrophic events turning out to be larger than projected losses. The level of activity for the 2009 Atlantic hurricane season is expected to be around the historical average (see Table 5.1). That would mean fewer hurricanes and storms than in the 2008 season, and the risks facing insurers can therefore be seen to be somewhat lower than at the time of the finalisation of the December 2008 FSR. It should, however, be borne in mind that the 2008 hurricane season was second in terms of destructiveness only to that of 2005 (see also Section 5.1), and significant losses may still occur in 2009. In addition, some of the insured losses from the costly 2008 season are still to be borne by insurers.

**Table 5.1 Atlantic hurricanes and storms recorded in 2008 and forecasts for 2009**

| | Historical average | 2008 | 2009 forecasts | |
|---|---|---|---|---|
| | | | CSU | NOAA |
| Named storms | 11 | 16 | 12 | 9-14 |
| Hurricanes | 6 | 8 | 6 | 4-7 |
| Major hurricanes | 3 | 5 | 2 | 1-3 |

Sources: Colorado State University (CSU) and National Oceanic and Atmospheric Administration (NOAA).

### CONTAGION RISKS FROM BANKING ACTIVITIES OR FROM OWNERSHIP LINKS TO BANKS AND OTHER FINANCIAL INSTITUTIONS

Insurers engaged in, for example, banking activities or insurers that are part of financial conglomerates may face particular risks in the currently testing environment for banks. The euro area insurers with ownership links to banks have, in general, indeed been more affected by the financial crisis thus far. This could continue to be a source of risk for some insurers through five main channels. First, losses incurred by a banking entity could be material and could thus also affect the group as a whole, including an insurance entity. Second, a deterioration of conditions in a banking entity that leads to rating downgrades could affect the rating and, thereby, the financing costs of an insurance entity. Third, an insurance entity might be called upon to provide intra-group transfers of liquidity to an ailing banking entity. Fourth, there could be a reputation risk from, for example, losses or liquidity problems reported by a banking entity spreading to an insurance entity or the group as a whole. Fifth, many insurers hold significant amounts of senior debt and hybrid capital from banks and they could therefore be affected by valuation losses on such instruments.

### STRONG COMPETITION IN SOME SEGMENTS, TOGETHER WITH A STRONG FOCUS ON CREATING SHAREHOLDER VALUE

A further potential risk that could lead to vulnerabilities for some insurers arises from the continued competitive environment in some segments of the euro area insurance sector. Competition among non-life insurers, however, has decreased somewhat since the finalisation of the December 2008 FSR, given the reduced capacity and the distress of some key insurers (most notably AIG). Life insurers continue to compete with banks that offer similar saving products.

Many euro area insurers continue to have a strong focus on creating shareholder value – as shown by the commitment of some insurers to maintaining dividends and share buyback programmes. Strong competition and the focus on

creating shareholder value could lead to increased risk-taking by insurers in their investment activities and underwriting.

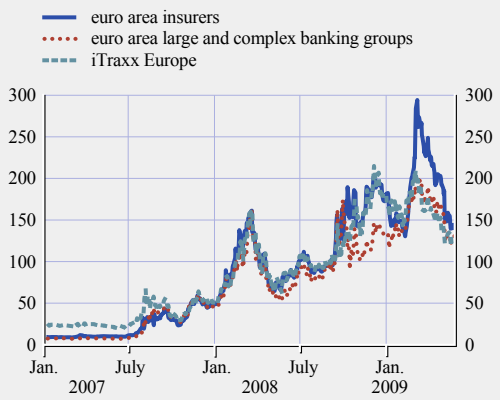
## 5.3 OUTLOOK FOR THE INSURANCE SECTOR ON THE BASIS OF MARKET INDICATORS

On average, large euro area insurers' credit default swap (CDS) spreads rose significantly above those of euro area banks and the European iTraxx main index in late February and early March 2009 (see Chart 5.9). Increased uncertainty surrounding the outlook for insurers and uncertainty regarding potential government support for insurers in the event of problems contributed to this development. After March, insurers' CDS spreads narrowed rapidly although they remained higher than those of euro area banks and the main iTraxx index.

Expectations of weaker financial performances among euro area insurers during the past six months has also been implied in euro area insurers' stock prices, which continued to fall after the finalisation of the December 2008 FSR, until mid-March. Since then, however, stock prices have rebounded significantly and currently stand at the levels seen at the time of the finalisation of the December 2008 FSR (see Chart S126).

**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 – May 2009; basis points; five-year maturity; senior debt)




Sources: Bloomberg and JPMorgan Chase & Co.

Although share prices of euro area insurers have risen in recent months, price/earnings ratios remain at low levels – about seven, on average – based on average profits for the last ten years (see Chart S129). This suggests that market participants still assess the earnings prospects of the sector as being less positive. At the same time, euro area insurers' expected default frequencies are currently higher than they were at the time of finalisation of the December 2008 FSR (see Chart S124).

Weaker financial performances and the riskier outlook for euro area insurers have led to several of them having their insurance financial strength ratings downgraded by rating agencies in the past six months. Rating agencies also have a negative outlook for the European insurance sector as a whole and for many euro area insurers.

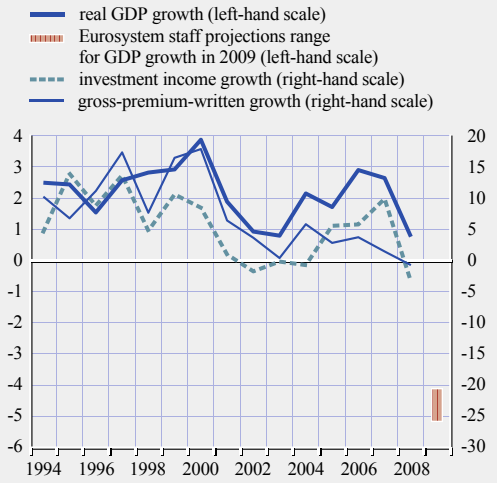
All in all, patterns in market indicators over the past six months have continued to imply a persistently less favourable and uncertain outlook for the euro area insurance sector.

## 5.4 OVERALL ASSESSMENT

The financial performance of primary insurers and reinsurers deteriorated in the second half of 2008 and the first quarter of 2009. Pre-existing risks and challenges for the sector have increased and continued to materialise, and are contributing to continued uncertainty about the outlook. In particular, the slowdown of economic activity is weighing on the underwriting performance of euro area insurers (see Chart 5.10). At the same time, the stresses in financial markets continue to pose challenges for the stability of insurers' investment income.

**Chart 5.10 Gross premiums written and investment income for a sample of large euro area insurers, and euro area real GDP growth**

(1994 – 2009; percentage change per annum)




Sources: ECB, Thomson Financial Datastream and ECB calculations.

The most significant risks euro area insurers currently face include:

- ⬆ financial market/investment risks;
- ⬆ risks associated with a deteriorating macro-financial environment;
- ➡ contagion risks from banking activities or ownership links to banks and other financial institutions;
- ➡ longevity risks;
- ⬇ risk of losses from catastrophic events exceeding projected losses; and
- ⬇ strong competition in some segments, together with a strong focus on creating shareholder value.

⬆ *Increased risk since the December 2008 FSR*
➡ *Unchanged since the December 2008 FSR*
⬇ *Decreased risk since the December 2008 FSR*

It is important to bear in mind that disclosed solvency positions of euro area insurers indicate sufficient remaining shock-absorption capacity for weathering the materialisation of the risks they currently face. Nevertheless, insurers and insurance supervisors need to have a clear understanding of the risks confronting the insurance sector and they should take necessary action to manage them. For insurers, this could include reducing large investment exposures, for example by hedging, and careful consideration of whether share buyback programmes and dividend payouts should be maintained. A greater transparency of investment exposures and the accounting methods used is also needed and should be promoted by insurance supervisors.

# 6 STRENGTHENING FINANCIAL SYSTEM INFRASTRUCTURES

*As a result of the intensification of the financial turmoil from September 2008 onwards, the increased volatility of financial markets led to peaks in the transaction turnover of some financial market infrastructures. Nevertheless, the overall performance of key euro payment systems and securities clearing and settlement systems remained stable and resilient over the past six months. The experience gained so far in the live operation of TARGET2 has demonstrated the robustness of the system. Moreover, the oversight assessment of the design of TARGET2 confirmed its high level of compliance with the applicable Eurosystem standards. It is also reassuring that the operational performance and service provision of CLS was resilient in the reporting period. Finally, further progress has been made on reinforcing the soundness and safety of the post-trading infrastructures. The work on the implementation of the recommendations jointly developed by the European System of Central Banks (ESCB) and the Committee of European Securities Regulators (CESR) is on schedule, while efforts to establish central counterparties (CCPs) for over-the-counter (OTC) derivatives have continued in recent months.*

The sound functioning of financial market infrastructures is of great importance for the overall stability of the financial system, which relies on the capability of these systems to contain systemic risk. The smooth operation of systemically important payment and settlement infrastructures also contributes to the implementation of the single monetary policy of the Eurosystem. The main objective of the oversight of financial market infrastructures is to prevent both disturbances in the infrastructures and the spillover of disturbances into the financial system and the economy as a whole. This section provides an overview of the relevant oversight activities related to key euro market infrastructures and the main developments in this area.

## 6.1 PAYMENT INFRASTRUCTURES AND INFRASTRUCTURE SERVICES

### DEVELOPMENTS IN KEY EURO PAYMENT INFRASTRUCTURES

#### TARGET2

As reported in the last issue of the Financial Stability Review (FSR), the migration of the first-generation of TARGET to TARGET2 was successfully finalised in May 2008. In line with its prominent role in the large-value euro payments market, expectations for the new generation of TARGET were very high. These expectations can basically be grouped into two main categories, both of which have relevance for the financial stability of the euro area: the system should provide enhanced business functionality and should meet high-level operational standards, benefiting from the integrated technical infrastructure.

The business functionality provided by TARGET2 was developed in close cooperation with the representatives of the user community via a number of consultations, aiming to address the various business needs of the wide range of participants. As a result of the preparatory work, the system not only provides updated and extended functionalities, but also offers a more advanced and harmonised service level and a common pricing scheme to all participants. The liquidity management features and the settlement solutions provided for ancillary systems are probably the two most important areas of the system's business functionality from a financial stability perspective. As the key tools for liquidity management have been presented in previous issues of the FSR, this time the service options granted for ancillary systems are explained in more detail. Ancillary systems are different types of market infrastructure (including retail payment systems, large-value payment systems, foreign exchange settlement systems, clearing houses and securities settlement systems) settling their final cash positions in TARGET2. These infrastructures process high volumes and values of transactions comprising interbank

payments (wholesale and consumer payments), the cash leg of securities settlements and CCPs flows, and the secure settlement of these transactions is thus of paramount importance for the healthy functioning of the financial system as a whole. In order to promote the smooth settlement of payment orders submitted by the ancillary systems, TARGET2 employs dedicated functionality and specific procedures. Ancillary systems can easily access any of their participants' accounts in TARGET2 via a standardised interface. In addition, they can use one of the six generic settlement procedures offered, including real-time settlement and various kinds of bilateral and multilateral settlement in batch mode. TARGET2 also adapts the requirement of ancillary systems to freely define the timing of their settlement, i.e. the settlement of ancillary systems can take place at any time during the day trade phase (7 a.m. to 6 p.m.) as well as during the night-time settlement window (7.30 p.m. to 10 p.m. and 1 a.m. to 6.45 a.m.). In order to help them to plan and control their liquidity flows, TARGET2 participants have been made aware of the schedule for the settlements of ancillary systems (which currently number 69).

The first factor to stress in the context of improving the operational reliability of TARGET2 is that the original decentralised TARGET system was replaced by fully integrated technical architecture, in the form of the Single Shared Platform (SSP). The SSP, developed and technically operated by three central banks – the Banca d'Italia, the Banque de France and the Deutsche Bundesbank – on behalf of the Eurosystem, is designed to ensure a high level of resilience based on its "four sites in two regions" concept. In each of the regions, a secondary site serves as back-up and, if necessary, can take over the role of the production site at any time without interruption (with no special action required from participants). In addition, the primary operation of the SSP is periodically rotated between the two regions. In the event of a disruption affecting both sites in one region, operations can be fully restored in the other region within two hours, which corresponds to leading market practice. These operational features strengthen the robustness and resilience of TARGET2 and help it to cope with a wide range of operational threats.

After more than one year of live operations, the experience gained so far suggests that TARGET2 has lived up to expectations: the system seems to be well-established, robust and reliable. It is also noteworthy that the recent global financial crisis has had no noticeable effect on the smooth functioning of the system so far, which is seen as a positive sign for the financial stability of the euro area as a whole.

### Operational performance

During the period between 1 October and 31 December 2008, the average daily value of transactions settled in TARGET2 reached €2.92 trillion, while a daily average volume of 374,120 transactions were processed. The number of payments processed was unchanged compared with the previous reporting period, while a slight increase was observed in the value owing to the fact that higher values were settled, in particular in transfers to deposit facility accounts (accentuated by the financial crisis). TARGET2 maintained its leading position among large-value payment systems in the euro area, with market shares of 90% in terms of value and 60% in terms of volume (see Chart S130).

The improvement in the robustness and the real-time processing capability of TARGET2 was clearly demonstrated by the outstanding levels reached by the main operational performance indicators. The overall availability ratio of the system reached both its all-time record and the maximum possible level with 100%, which means that the system was fully available in the reporting period. Moreover, 99.99% of all transactions in TARGET2 were processed in less than five minutes (compared with 99.85% in the last reporting period), while the remaining 0.01% were processed within between five and 15 minutes (0.12% in the previous reporting period). The capability of the system to process transactions in real time

(i.e. in a matter of seconds) is seen as a key factor contributing to the significant reduction of liquidity risk.

### Incidents

As part of their ongoing activities, the TARGET2 overseers regularly monitor and assess the incidents that occur, concentrating on major incidents, i.e. those lasting more than two hours and/or leading to a delayed closing of the system. As the availability ratio indicates, no major interruptions affected the continuous functioning of TARGET2 between October 2008 and March 2009. There was one occasion in December 2008 when the TARGET2 operators decided to delay the closing of the system. The root cause of this event was outside the SSP, however: owing to a disruption in the technical infrastructure of one of the ancillary systems, the closure of TARGET2 was postponed by one hour.

After assessing the circumstances of the incident, the TARGET2 oversight function concluded that it had had no adverse impact on the compliance of the system with the relevant Core Principle (Core Principle VII on security and operational reliability).

### Oversight assessment

The complex process of oversight assessment of the design of TARGET2 started in 2006, well before the system went live. During the various phases of the assessment, oversight concerns and recommendations were brought to the attention of the TARGET2 system operator, in order to help in designing a system that was in line with the applicable Eurosystem oversight standards. The assessment exercise was completed in early 2009, and the outcome was presented in detail in the first comprehensive oversight assessment report on TARGET2, published on the website of the ECB.[1] An overview of the results of the assessment is provided below.

In line with the Eurosystem's oversight policy, the TARGET2 oversight function, led and coordinated by the ECB, assessed the design of TARGET2 against the Core Principles for Systemically Important Payment Systems,[2] including the Eurosystem's business continuity oversight expectations.[3] The assessment focused primarily on the SSP as the core of the TARGET2 system, but also covered the proprietary home accounts (PHAs) of six central banks (those of Belgium, Germany, Lithuania, Austria, Poland and Portugal) as they provide certain real-time gross settlement services for a limited period of time. The common oversight assessment methodology developed by the Eurosystem formed the basis of the exercise.[4]

The overall conclusion of the report is that the design of TARGET2 observes all nine applicable Core Principles.[5] In addition, the operation of the six PHAs does not adversely affect the smooth operation of TARGET2 and its compliance with the Core Principles.

### CLS

The Continuous Linked Settlement (CLS) system is managed by CLS Bank International, which is incorporated in New York. The CLS system was launched in September 2002 with a view to providing a multi-currency service for the synchronous, i.e. payment-versus-payment (PvP), settlement of payment instructions relating to foreign exchange transactions with finality. As a result of the PvP mechanism, CLS virtually eliminates foreign exchange settlement risk for its members. CLS settles in 17 of the world's most traded currencies, including the US dollar, the euro, the Japanese yen, the pound sterling and the Swiss franc.

1 See ECB, "Assessment of the design of TARGET2 against the Core Principles", May 2009.
2 See Report by the Committee on Payment and Settlement Systems on "Core Principles for Systemically Important Payment Systems", BIS, January 2001.
3 See ECB, "Business continuity oversight expectations for systemically important payment systems", June 2006.
4 See ECB, "Terms of reference for the oversight assessment of euro systemically and prominently important payment systems against the Core Principles" and "Guide for the assessment against the business continuity oversight expectations for systemically important payment systems", November 2007.
5 Core Principle V on multilateral netting is not applicable to TARGET2.

Owing to the fact that it is incorporated in New York, CLS Bank is supervised by the Federal Reserve System. However, given the systemic relevance of CLS and its multi-currency nature, the ECB, together with the G10 central banks and the central banks whose currencies are settled in CLS, participates in a cooperative oversight arrangement, with the Federal Reserve System having the role of primary overseer. Within the Eurosystem, the ECB is the central bank with primary oversight responsibility for settlement in euro by CLS. The main responsibility of the overseeing central banks is to ensure the continued compliance of CLS with the Core Principles. In accordance with its mandate, the ECB, together with the euro area national central banks, ensures that offshore payment infrastructures, such as CLS, which settle euro-denominated payment transactions outside the euro area, comply with the Eurosystem's oversight policy principles on the location and operation of infrastructures settling euro-denominated payment transactions, published in July 2007.

Looking at new developments in CLS, the recent announcement of a joint venture by CLS and ICAP[6] concerning the creation of a new trade aggregation service should be noted. The new service is expected to be in operation by mid-2009 and, according to a press release issued by the two companies, "will provide the means to reduce operational risk, rationalise and consolidate legacy post trade processes and reduce post trade costs in the global FX markets". The overseers will closely monitor the evolution and performance of the new service and its impact on the CLS system.

### Operational performance

Following the record transaction volume in September and October 2008, the volume of transactions settled through CLS during the period from 1 November 2008 to 31 March 2009 returned to a level in line with the steady growth experienced during 2008, with an average daily volume of 550,000 sides being settled in this period. The average daily value settled in this period was USD 3.1 trillion. CLS experienced two peak days during the period under review. On 28 November, 1,145,192 sides were settled with a gross value of USD 6.1 trillion, while on 17 December, 985,796 sides with a gross value of USD 7.3 trillion were settled. The daily average euro values settled via CLS in this period amounted to USD 500 billion equivalent, eliminating foreign exchange settlement risk of approximately USD 474 billion equivalent. The volumes and values of single currency transactions settled in CLS, i.e. instructions relating to OTC credit derivatives and non-deliverable forward transactions, are still negligible in relative terms, but they have been growing constantly since CLS Bank began offering them.

### Incidents

Throughout the period from November 2008 to March 2009, all instructions were settled and all pay-outs achieved in CLS.

In terms of service provision, the number of external issues affecting the daily timeline of CLS was low. There were very few issues that affected the key targets and core availability of CLS. The incidents were related either to problems encountered by a few of its members, which resulted in slight delays in the settlement completion period, or to faults encountered in hardware devices in operation on its sites. With regard to the hardware issues, CLS is reviewing the process with the service provider to ensure that proper checks are adhered to in order to prevent such a problem occurring again.

## 6.2 SECURITIES CLEARING AND SETTLEMENT INFRASTRUCTURES

### ESCB-CESR

On 3 June 2008 the Ecofin Council invited the ESCB/CESR Working Group to finalise its draft recommendations on the soundness and safety

6 ICAP plc is an electronic interdealer broker and the source of global market information and commentaries for professionals in the international financial markets. The group is active in the wholesale markets in interest rates, credit, commodities, foreign exchange and equity derivatives. For more information, see the CLS and ICAP press release, April 2009.

of the post-trading infrastructure, respecting a number of principles. The ESCB and CESR updated the draft recommendations for securities settlement systems and CCPs in line with the Ecofin Council's principles and launched a public consultation, which ran from 23 October 2008 to 23 January 2009, in order to collect market views on the draft recommendations. In view of the financial stability risks posed by the growing scale of OTC derivatives exposures and, in particular, credit derivatives, the ESCB/CESR Working Group, upon invitation of the Ecofin Council, reviewed and adapted the recommendations for CCPs to also address risks of OTC derivatives. These amendments were subject to public consultation from 31 March to 17 April 2009. Publication of the final ESCB/CESR recommendations is scheduled for June 2009. The ESCB-CESR recommendations will replace the CPSS-IOSCO recommendations in the EU context. They are at the very least as stringent as the CPSS-IOSCO recommendations, so that compliance with ESCB-CESR automatically means compliance with CPSS-IOSCO. The ESCB-CESR recommendations focus, inter alia, on the harmonisation of EU rules and require, for example, CSDs to be open at least during TARGET2 operating hours, call for intraday finality in Europe to facilitate interoperability, require higher levels of risk management and transparency, and address additional risks with respect to clearing of OTC derivatives.

### OTC DERIVATIVES

Efforts to establish CCPs for OTC derivatives, particularly for credit default swaps (CDSs), have gained momentum in recent months.

In this context, there has been growing support for the establishment of multiple CCP solutions for the global CDS market, including at least one European solution.

The European Commission identified the establishment of one or more European CCP solutions for CDSs as a short-term priority task. At its meeting in December 2008, the Ecofin Council supported the European Commission's request and referred to it as a "matter of urgency".

The ECB hosted several meetings with representatives of the European banking and clearing industry, the Eurosystem, the European Commission, the EU Council, the European Parliament and other stakeholders to foster progress on the setting-up of one or more European CCPs for CDSs.[7]

The increased public sector impetus for the establishment of a European CCP for CDSs was followed up by more concrete industry commitments. In a letter sent to Commissioner McCreevy on 17 February, nine of the leading CDS dealer firms confirmed their commitment to using EU-based CCPs for CDSs and to working together with providers and regulators to ensure the establishment of such facilities by end-July 2009.

The Governing Council, in line with its earlier statement of September 2001 on the consolidation of CCP clearing, has confirmed that, given the potential systemic importance of securities clearing and settlement systems, at least one CCP for CDSs should be located within the euro area.[8]

The importance of a euro area solution is further underlined by the fact that the euro-denominated segment of global CDS markets is very significant, accounting for around 39% of all transactions. Against this background, it is particularly important to enable the Eurosystem to effectively perform its oversight function. Furthermore, users and possible CCP providers have emphasised in recent months that experience gained during the financial market turbulence suggests that access to relevant central banking operations of the Eurosystem, e.g. involving the provision of liquidity assistance, would be an important factor in ensuring the safety and resilience of a European CCP for CDSs.

7 The meeting documents are available at http://www.ecb.europa.eu/events/conferences/html/ccp_cds_meeting.en.html.

8 See http://www.ecb.europa.eu/press/govcdec/otherdec/2008/html/gc081219.en.html.

# IV SPECIAL FEATURES

## A DETERMINANTS OF BANK LENDING STANDARDS AND THE IMPACT OF THE FINANCIAL TURMOIL

*Banks are key providers of funds to firms and households in the euro area. The analysis of bank lending standards – banks' internal guidelines or criteria governing their loan policy – is therefore important for understanding the provision of credit in the euro area. This special feature first analyses the determinants of bank lending standards in the euro area and how changes in lending standards impact on banks' risk taking. Second, it shows that, generally, the risk built up by banks in good times may – via its impact on capital – imply future restrictions on the supply of loans and that bank balance sheet constraints may have a detrimental impact on the loan supply in the current crisis.*

### INTRODUCTION

Banks are the key providers of funds in most economies, particularly the euro area.[1] Therefore, it is crucial to understand the mechanisms governing their decisions to grant credit to firms and households. Lending standards – the lending terms and conditions specified in a loan contract – provide a core piece of information on these mechanisms in the euro area.

An important aspect of the analysis is to assess how the impact of short-term interest rates, and thus of monetary policy, is transmitted through the credit markets. This transmission works via different channels. Banks tend to adjust their lending rates to changes in policy rates with different degrees of sluggishness – the interest rate channel. Further, policy rates may impact the supply of credit, affecting the capital and liquidity positions of banks – the bank lending channel. At the same time, short-term rates also affect the creditworthiness of borrowers, and thus the agency cost of lending – the balance sheet channel.[2]

Short-term rates may also affect banks' appetite for risk. This mechanism – the risk-taking channel – has been the focus of more recent economic analysis, fuelled in part by the unfolding of the financial crisis.[3]

This special feature first analyses the determinants of bank lending standards in the euro area and, second, shows that in the current crisis bank balance sheet constraints may have a detrimental impact on the loan supply.

The evidence presented, which is based on the answers from the euro area bank lending survey,[4] suggests that risks that materialise in the downturn may have been building up in the upturn, when the economy was performing well. In particular, it is shown that lending standards are pro-cyclical.[5] High GDP growth tends to lower standards. In addition, a lower level of short-term interest

1 See P. Hartmann, A. Maddaloni and S. Manganelli, "The euro area financial system: structure, integration, and policy initiatives," *Oxford Review of Economic Policy*, Vol. 19, No 1, 2003, and F. Allen, M. K. F. Chui and A. Maddaloni, "Financial structure and corporate governance in Europe, the USA and Asia", in X. Freixas, P. Hartmann and C. Mayer (eds.), *Handbook of European Financial Markets and Institutions*, Oxford University Press, 2008.

2 For a detailed explanation of these mechanisms, see B. S. Bernanke and M. Gertler, "Inside the black box: the credit channel of monetary policy transmission", *Journal of Economic Perspectives*, 9(4), 1995.

3 See, for example, C. Borio and H. Zhu, "Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism?", *BIS Working Paper*, No 268, Bank for International Settlements, 2008; V. Ioannidou, S. Ongena and J.-L. Peydró, "The impact of short-term interest rates on risk taking: Hard evidence", in A. Felton and C. Reinhart (eds.), *The First Global Financial Crisis of the 21st Century*, Center for Economic Policy Research, 2008; 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?", *CEPR Discussion Paper*, No 6514, Center for Economic Policy Research, 2007.

4 For a detailed explanation of the euro area bank lending survey, see J. Berg, A. van Rixtel, A. Ferrando, G. de Bondt and S. Scopel, "The bank lending survey for the euro area," *ECB Occasional Paper Series*, No 21, 2005, and S. Sauer, "The euro area bank lending survey – a review of six years of experience", *Revue Bancaire et Financière*, forthcoming.

5 This finding is in line with A. N. Berger and G. Udell, "The institutional memory hypothesis and the procyclicality of bank lending behaviour," *Journal of Financial Intermediation*, Vol. 13, No 4, 2004.

rates generally softens standards. Moreover, the softening of standards is over and above changes in the quality of borrowers' collateral and the industry-specific economic outlook, which may point to excessive increases in banks' risk-taking during economic upturns. Standards are eased for all types of loans, but the impact is larger for loans to non-financial corporations.

Concerning the impact of financial innovation, a higher level of securitisation softens standards and increases the impact of a low level of short-term interest rates on standards.

These results suggest that low short-term rates, especially in an environment where securitisation activity allows banks to sell off risks to third parties, could cause an *excessive* softening of standards in the upturn of the cycle, which materialises as bank problems in the medium term.[6] Once banks begin to suffer from balance sheet difficulties (as in the current situation, for example), they react by tightening standards, which tends to have a detrimental impact on the provision of credit and may ultimately affect economic activity with potential amplifying "second-round" effects on bank sector stability.

It should be pointed out that empirical analysis using bank lending survey data is still subject at this stage to the constraint of a relatively short time series covering not quite one business cycle. However, the availability of a large panel covering data for 12 countries and the non-synchronisation of business cycles across countries significantly enlarges the data sample.

Section 2 describes the bank lending survey for the euro area, while Section 3 analyses the determinants of lending standards and Section 4 studies the impact of supply-side factors on bank lending during the financial crisis. Section 5 concludes.

## THE BANK LENDING SURVEY

The Eurosystem's bank lending survey for the euro area was introduced in 2003 and is conducted at a quarterly frequency.[7] In the survey, reporting banks reply to a set of questions on the credit standards that they apply to loans to enterprises (including both small and large enterprises) and to households (both loans for house purchase and consumer credit). Apart from the general questions on the extent to which banks have changed their credit standards in comparison with the previous quarter and how they expect to change them in the next quarter, the survey also includes questions related to the factors that contributed to changes in the standards, such as banks' risk perception, bank balance sheet constraints and competitive conditions, as well as questions related to how lending terms and conditions have been changed. In addition, banks are asked to report how they perceive the demand for loans (from enterprises and households respectively) to have developed in the previous quarter. As for credit standards, banks likewise report on the relative importance of the factors contributing to changes in perceived loan demand (such as borrowers' financing needs and their use of alternative sources of financing). Furthermore, non-standard questions are occasionally included in the survey on an ad hoc basis, with the aim of covering specific (structural and cyclical) developments in euro area credit markets that are not captured by the standard questionnaire.[8]

The sample currently consists of 118 reporting banks covering the 16 euro area countries.[9] The sample banks are selected in such a way as to produce a fair representation of the euro area banking sector, taking into account differences in the banking structures across countries.

6 For the origins of banking instabilities, see O. de Bandt, P. Hartmann and J.-L. Peydró, "Systemic risk in banking: An update," in A. Berger, P. Molyneux and J. Wilson (eds.), *The Oxford Handbook of Banking*, 2009. For evidence on bank contagion, see R. Iyer and J.-L. Peydró, "Interbank contagion at work: Evidence from a natural experiment," *The Review of Financial Studies*, 2009.

7 Similar surveys were already conducted by the Federal Reserve System and the Bank of Japan. More recently, bank lending surveys have also been introduced by other central banks within the EU.

8 For example, various ad hoc questions concerning the impact of the financial crisis on bank lending conditions have been included since the October 2007 survey round.

9 Owing to mergers and other structural changes in the national banking sectors, the sample of banks has changed slightly since the inception of the survey in 2003. The entry of new euro area countries has also led to an increase in the number of reporting banks over the years.

Overall, the surveyed banks cover around half of all the loans granted by monetary financial institutions (MFIs) to the non-financial private sector in the euro area.

## DETERMINANTS OF LENDING STANDARDS

This section analyses the financial and macroeconomic factors affecting euro area bank lending standards. Lending standards describe a bank's general loan policy and are reflected in the set of all lending terms and conditions specified for the bank's typical business loan, line of credit or loan to a household. Apart from the volume and interest rate, important standards include collateral, covenants, maturity and loan limits.

On the basis of a panel regression, lending standards are found to be pro-cyclical, i.e. higher real GDP growth tends to soften lending standards, whereas lending standards are tightened in a downturn of the business cycle.[10] Lending standards also depend on short-term interest rates. In particular, a lower level of overnight rates (as measured by the EONIA) softens overall lending standards, both for average and for riskier loans. The results are economically significant: the impact of a change in the EONIA is more than ten times that of a change in GDP growth, despite having similar variations.

Moreover, the softening of lending standards is over and above changes in the quality of borrowers' collateral and the industry-specific outlook (i.e. over and above the balance sheet channel of monetary policy transmission), which may suggest an increase in bank risk.[11]

The analysis of the terms and conditions of loans shows that banks soften their standards by reducing spreads on average loans, but also by reducing collateral requirements and covenants, and by increasing loan amounts and maturities. The softening of standards applies to all types of loan, but the impact is larger for loans to non-financial corporations.

A relative measure of the level of interest rates is the difference between the rate implied by a simple Taylor rule and the EONIA. Lending standards are also affected by these relative levels of rates, and they tend to be eased when the level of short-term rates is low compared with the rate implied by a Taylor rule. This impact tends to be stronger when short-term rates have been low for some time, especially for loans to households. Therefore, rates that are too low for too long seem to soften standards even further.

Overnight rates affect bank lending standards more than other yield curve measures, such as long-term rates and term spreads. Short-term rates affect funding liquidity, and this in turn has a direct effect on the supply of credit.[12]

An important development in the banking sector in the euro area over the last decade has been the use of securitisation. Using a measure of securitisation at the country level,[13] panel regressions show that a higher level of securitisation softens bank lending standards.[14]

10 For a detailed analysis of the results presented in this section, see A. Maddaloni, J.-L. Peydró and S. Scopel, "Does monetary policy affect bank credit standards? Evidence from the euro area bank lending survey", *ECB Working Paper,* forthcoming; G. De Bondt, A. Maddaloni, J.-L. Peydró and S. Scopel, "The bank lending survey matters: first empirical evidence for euro area credit and output", *ECB Working Paper,* forthcoming; A. Maddaloni and J.-L. Peydró, "Bank risk-taking, securitization, supervision and low interest rates", paper presented at the conference on "The financial crisis", organised by the *Review of Financial Studies* and *Yale School of Management*, July 2009; and M. Ciccarelli, A. Maddaloni and J.-L. Peydró, "Trusting the bankers: a new look at the credit channel of monetary policy", *ECB Working Paper,* forthcoming.

11 The findings are robust to different controls, measures of monetary policy and econometric specifications. The basic control variables are GDP growth, inflation, country risk, loan demand proxied by the results of the bank lending survey, country-specific fixed effects and, in some specifications, time and bank-specific fixed effects. Moreover, several alternative measures of the stance of monetary policy are used, such as variations in nominal overnight rates and/or real short-term rates, or differences between overnight rates and Taylor-rule implied rates.

12 See K. Nikolaou, "Liquidity (risk) concepts: definitions and interactions," *ECB Working Paper*, No 1008, 2009.

13 The measure of securitisation used is the quarterly volume of securitisation activity based on the nationality of the collateral, normalised by the total lending activity in each country (sources: ECB, Eurostat, Thomson Financial Datastream, Dealogic and ECB calculations).

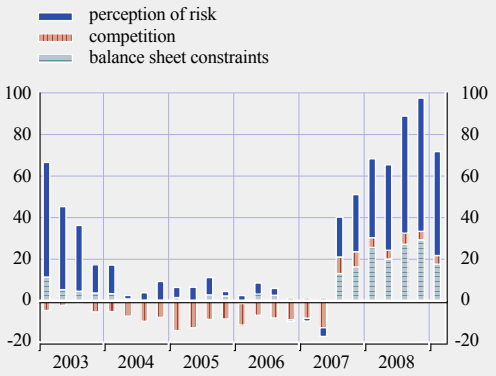
14 This is also in line with the findings of the microeconometric study by Y. Altunbas, L. Gambacorta and D. Marqués-Ibañez, "Securitisation and the bank lending channel," *European Economic Review,* forthcoming.

This softening could be due to the improvement in bank performance owing to securitisation. On the other hand, it could be due to the lack of proper incentives to monitor borrowers if securitised assets are completely taken off bank balance sheets.[15] It is found that the level of securitisation softens standards to a greater extent when overnight rates are lower, so that the softening of standards is greater when both the level of overnight rates is low and the level of securitisation is high. This result is consistent with the argument that lower levels of overnight rates induce a search for yield, and securitisation can provide high-yield assets. Since securitised assets are sold, they give little incentive for a proper screening by banks; hence, banks tend to be (too) soft when setting their standards.

The results shown in this section suggest that several determinants of lending standards contribute to an accumulation of risks that may materialise in the medium term.

**Chart A.1 Factors contributing to changes in credit standards applied to loans and credit lines to enterprises in the euro area (bank lending survey)**

(Q1 2003 – Q1 2009; net percentages)




Source: ECB.
Note: The "perception of risk" factor encompasses the "industry and firm-specific outlook", "expectations regarding general economic activity" and the "risk on collateral demanded"; the "competition" factor encompasses competition from "other banks", "non-banks" and "market financing"; the "balance sheet constraints" factor encompasses "costs related to bank's capital position", "bank's ability to access market financing" and "bank's liquidity position". The net percentages reported for the three groups of contributing factors are simple averages of the underlying factors.

## THE IMPACT OF SUPPLY-SIDE FACTORS ON BANK LENDING DURING THE FINANCIAL CRISIS

The financial crisis that erupted in mid-2007 had significant negative implications for banks' profitability and, hence, also for their capital positions – mainly as a result of the severe losses and write-downs on banks' trading books. Furthermore, the past two years' disruptions in the securitisation and interbank markets have significantly hampered banks' funding abilities. Indeed, according to the bank lending survey results, bank balance sheet constraints have become more stringent during the crisis (see Chart A.1).[16]

A key question is to what extent the current constraints on bank balance sheets are likely to impair lending activity. This issue is analysed in the following, using information from the bank lending survey.

Using a country-panel estimation approach, estimates of the impact of balance sheet constraint factors on corporate and household lending respectively are derived.[17] These factors, as taken from the bank lending survey, can be interpreted as pure credit-supply effects,[18] whereas the bank lending survey factors concerning the perception of risk, for example, could also contain demand-side elements.

It is found that bank balance sheet constraints, in particular "costs related to bank's capital position", tend to have a significant negative impact on banks' (new business) lending to

15 See A. R. Mian and A. Sufi, "The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis," *Quarterly Journal of Economics*, forthcoming.

16 See also H. S. Hempell, "Credit constraints in the euro area? – Bankers' perceptions", *Kredit und Kapital*, Vol. 40, No 1, 2007.

17 Controlling for the business cycle and other demand-side factors, e.g. by including investment, interest rates, house prices and the inflation rate, as well as bank lending survey information on demand developments, in the regression.

18 They refer to "costs related to bank's capital position", "bank's ability to access market financing" and "bank's liquidity position" in the case of loans to non-financial corporations and to "cost of funds and balance sheet constraints" in the case of housing loans, each measured in net percentages (i.e. the percentage of banks reporting a contribution to the tightening of credit standards by the respective factor minus the percentage of banks reporting a contribution to the loosening of credit standards).

non-financial corporations, as taken from the MFI interest rate statistics, even after controlling for various demand-side factors.[19]

Supply-side constraints are found to be particularly important in the case of corporate lending. The estimates with respect to total new business loans to non-financial corporations (excluding overdrafts) suggest that a net tightening of 1 percentage point in credit standards due to banks' cost of capital would result in a decline of 0.1% in new business lending.[20]

The financial turmoil has weakened the capital bases of many banks, and the sharp declines in their stock prices have compelled banks to face pronounced rises in their cost of capital. These developments have also been reflected in the answers to the bank lending survey, where a significant percentage of banks have reported that their capital position has contributed substantially to the net tightening of credit standards. On the basis of the estimated importance of supply-side constraints, the reported net tightening points to non-negligible effects on the supply of bank loans in the coming quarters.

Notably, the estimated coefficient on "banks' cost of capital" is larger and more significant for larger loans (i.e. loans of more than €1 million) to non-financial corporations, whereas it is statistically not significant for smaller loans (i.e. loans below €1 million). This could reflect the fact that large loans are particularly costly in terms of capital allocation, especially under the current circumstances where capital bases are being eroded and banks find it difficult to pass on credit risk. Small loans to non-financial corporations are found to be a little less constrained by supply-side factors. Nonetheless, the estimated coefficient on "banks' access to market funding" is found to be negative and statistically significant, which suggests that, especially in recent quarters, banks may have found it increasingly difficult to obtain market-based funding for their lending, for example by issuing collateralised loan obligations (CLOs).[21]

Higher risk perceptions impact positively on the volume of new lending to enterprises; this holds for overall lending, as well as for large loans, while they remain insignificant for small loans. Such findings might indicate an increase in demand for bank loans from enterprises during periods when internal financing is scarce or when alternative financing via financial markets is more difficult.

A generally somewhat more pronounced impact of supply-side constraints on larger loans is consistent with the answers to the bank lending survey, which show that the net tightening of credit standards applied to loans to enterprises was more pronounced for large firms than for small and medium-sized enterprises (SMEs) at the beginning of the financial market turmoil. Furthermore, cost of funds and balance sheet constraints affected the tightening of credit standards to a greater extent for large firms than for SMEs, indicating a greater importance of supply-side restrictions for lending to large enterprises. However, since mid-2008, the net tightening of credit standards applied to loans to SMEs has caught up markedly. This process of catching up, although largely driven by risk-related factors, i.e. factors related to the overall deterioration of the economic outlook, implies that it remains unclear whether SMEs or large corporations will be hit harder by banks' supply constraints in the course of 2009. The catching

19 This finding is in line with other studies exploring the importance of capital on banks' lending decisions. See, for example, L. Gambacorta and P. Mistrulli, "Does bank capital affect lending behaviour?", *Journal of Financial Intermediation*, Vol. 13, 2004; R. P. Kishan and T. P. Opiela, "Bank capital and loan asymmetry in the transmission of monetary policy", *Journal of Banking and Finance*, Vol. 30, 2006; F. Boissay and C. Kok Sørensen, "The stabilising effects of risk-sensitive capital management", *ECB Working Paper*, forthcoming; and ECB, "Deleveraging and resilience among large and complex banking groups in the euro area", *Financial Stability Review*, December 2008.

20 This is consistent with the recent finding that demand-side factors have not been able to fully explain actual corporate loan growth in the euro area in recent years; see C. Kok Sørensen, D. Marqués Ibañez and C. Rossi, "Modelling loans to non-financial corporations in the euro area", *ECB Working Paper*, No 989, 2008.

21 Thus, according to the Dealogic database, in April 2009 the annualised issuance of euro-denominated CLOs stood at around €20 billion, compared with €60 billion in mid-2007.

up was also reflected in the data on bank lending rates from the MFI interest rate statistics, which have shown a renewed widening of spreads for small loans versus larger loans since the last few months of 2008.

In the case of lending to households for house purchase, the impact of "pure" supply-side constraints is somewhat more difficult to detect. Although the "cost of funds and balance sheet constraints" factor negatively affects mortgage lending, the coefficient of the regression is not statistically significant. The overall size of such an effect would be somewhat lower than in the case of enterprises, given similarly sized coefficients but lower bank lending survey net percentages. At the same time, factors contributing to a tightening of credit standards that reflect competition from other banks and banks' expectations for the general economic outlook are found to be negatively and highly significantly related to new business lending for house purchase, as taken from the MFI interest rate statistics. The latter also indicates, apart from the high statistical significance, a high economic relevance, as the current respective bank lending survey net percentage is rather high. These results indicate that, for housing loans in particular, risk-related factors can be expected to substantially impact on new business volumes.

## CONCLUDING REMARKS

The results of an econometric analysis based on the answers to the bank lending survey for the euro area show that bank lending standards are pro-cyclical and are considerably softened in the upturn of the business cycle. Moreover, low levels of short-term rates and high levels of securitisation lower standards even further.

In the downturn of the cycle, on the other hand, constraints on the balance sheets of the banks lead to a tightening of lending standards, which has significant implications for credit and, potentially, also for output growth.

The two phases seem to be connected. If lending standards are too soft in the upturn of the cycle, risk is built up. The accumulation of risk seems to be connected to the availability of liquidity, but also to the possibility of transferring risks to third parties through financial innovation.

When the risk materialises, banks' capital and liquidity positions are usually affected and banks react by tightening standards. This, in turn, may have amplifying effects on the real economy, which can lead to "second-round" effects on banking sector stability.

## B LIQUIDITY HOARDING AND INTERBANK MARKET SPREADS

*Interbank markets play a key role in banks' liquidity management and the transmission of monetary policy. With the onset of the financial crisis, liquidity has been reduced in some segments of the interbank market. Moreover, since late September 2008, banks have hoarded liquidity instead of lending excess funds in the interbank market. The malfunctioning of interbank markets endangers the stability of the banking system. This special feature argues that asymmetric information about credit risk is an important factor contributing to these patterns.*

### INTRODUCTION

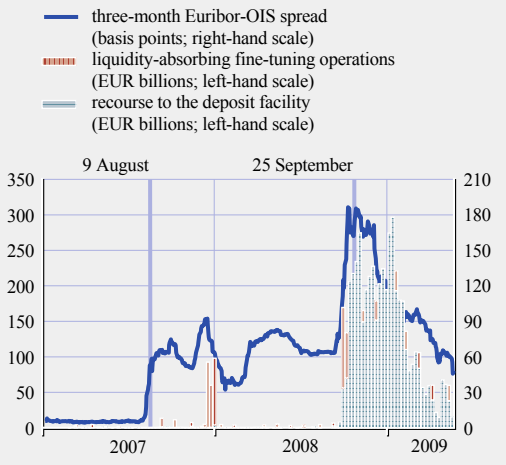
Money markets have undergone a dramatic change during the ongoing financial crisis. Before August 2007, euro area money markets were functioning smoothly. Rates were broadly stable, with little dispersion across counterparties, and the market was liquid, especially at the short end. When tensions originating in the US sub-prime mortgage market spilled over to the euro money market in August 2007, the picture changed. Interest rates jumped to higher levels and market activity declined, particularly in the unsecured money market segment with longer-term maturities.

A standard measure of tensions in the interbank market is the spread between the three-month unsecured interbank rate in the euro area (Euribor) and the three-month overnight index swap (OIS) rate. The OIS is a measure of what the market expects the overnight unsecured rate to be over a three-month period. Since interest rate expectations are controlled for,[1] the spread reflects other factors, such as liquidity effects[2] and credit risk. This special feature highlights how higher perceived credit risk can affect the functioning of the unsecured interbank market.[3]

Before August 2007, the Euribor/OIS spread was fairly stable, at around three to five basis points, reflecting the fact that liquidity was flowing smoothly between borrowers and lenders,

**Chart B.1 Three phases in the euro area interbank market**

(Jan. 2007 – May 2009)




Sources: ECB, Bloomberg, Thomson Financial Datastream and ECB calculations.
Note: The chart shows the spread between three-month bank borrowing costs and the three-month overnight index swap rate in the euro area, recourse to the ECB deposit facility (daily average flows per week in EUR billion), and liquidity-absorbing fine-tuning operations (daily average flows per week in EUR billions).

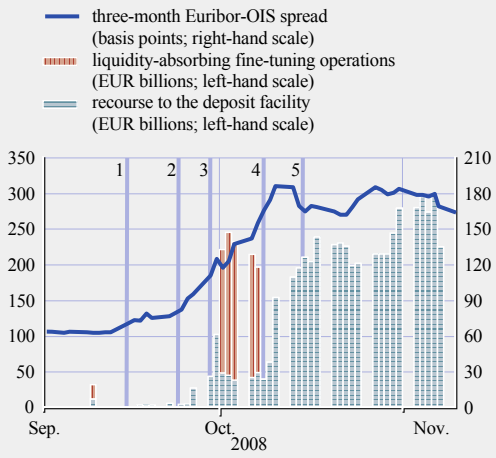
and that the probability of non-repayment of a money market loan was perceived to be low (see Chart B.1). As of August 2007, the spread jumped, and remained wide for around one year. Also, since the onset of the crisis, the overnight interbank market has seen an increase in volume. The average daily volume was €40.9 billion in the year to 9 August 2007. It increased by about 30%, to €52.1 billion, in the period between 9 August 2007 and 26 September 2008. This increase could reflect a substitution towards more short-term financing in the interbank market.

After further tensions emerged in September 2008, the spread again increased to unprecedented levels. The money market entered yet another qualitatively different phase. In addition to a

1 Usually, the overnight unsecured rate is very close to the ECB's minimum bid rate (the policy rate).
2 Liquidity risk premia in the unsecured interbank market were the subject of analysis in ECB, "Liquidity risk premia in money market spreads", *Financial Stability Review*, December 2008.
3 The analysis in this special feature is based on F. Heider, M. Hoerova and C. Holthausen, "Liquidity hoarding and interbank market spreads: the role of counterparty risk", *ECB Working Paper*, forthcoming.

**Chart B.2 Transition to the third phase and major events in September – October 2008**

(Sep. 2008 – Nov. 2008)

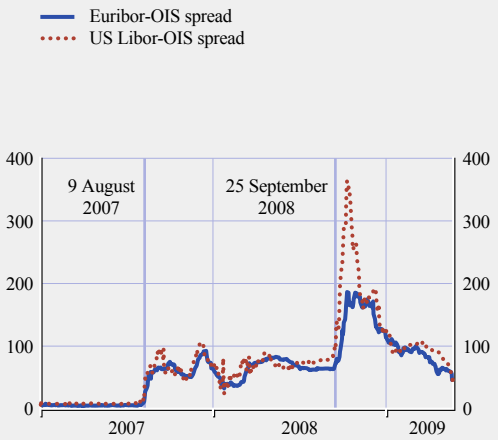



1 Lehman bankruptcy.
2 WaMu seized, TARP negotiations stall.
3 Fortis, Wachovia, HRE, B&B, Glitnir.
4 ECB corridor narrows.
5 Full allotment by the ECB.

Sources: ECB, Bloomberg, Thomson Financial Datastream and ECB calculations.
Notes: The chart zooms in on the period between September and November 2008. It shows the spread between three-month bank borrowing costs and the overnight index swap in three months' time in the euro area, recourse to the ECB deposit facility, liquidity-absorbing fine-tuning operations, along with the major events in the time period.

**Chart B.3 Three-month interbank spreads in the United States and the euro area**

(Jan. 2007 – May 2009; basis points)




Sources: Bloomberg, Thomson Financial Datastream and ECB calculations.
Note: The chart shows the spread between three-month bank borrowing costs and the three-month overnight index swap in the euro area and in the United States.

continuing rise in the spread, this third phase can be distinguished by a dramatic increase in the usage of the deposit facility by banks. The total liquidity absorbed by the ECB (deposits plus liquidity-absorbing open market operations) rose from a daily average of €0.09 billion in the week beginning 1 September 2008 to €169.4 billion in the week beginning 29 September 2008. Between the week beginning 22 September and the following week, the average daily volume in the overnight unsecured interbank market (not shown) in the euro area almost halved, a drop of €29.3 billion, while the amount of liquidity absorbed by the ECB increased by €152.9 billion. Banks seemed to prefer hoarding funds rather than lending them out even overnight.

The transition to the third phase and the major developments of the financial crisis at the time are depicted in more detail in Chart B.2. The amounts deposited with the ECB start rising after the collapse of Washington Mutual, when the crisis spread beyond the US investment banking sphere. The process intensified when the crisis put some European banks under severe pressure at the end of September 2008. Importantly, this rise preceded the ECB announcement of a change in its tender procedure and in the standing facilities corridor on 8 October 2008.

A similar pattern in the three-month interbank market spread can be observed in the United States in the aforementioned time period, as documented in Chart B.3.[4]

Central banks are particularly concerned with the proper functioning of the interbank market because it is an important element in the transmission of monetary policy, and because it may affect financing conditions faced by non-financial corporations and households.

4 See also Box 3 in ECB, *Financial Stability Review*, December 2008.

As monopoly providers of base money, central banks are in a key position when it comes to ensuring its functioning. In many countries, central banks have reacted to events by introducing measures to support the interbank market, trying to prevent market-wide liquidity problems from turning into solvency problems for individual institutions, and thus threatening financial stability.

In particular, since the beginning of the turmoil, many central banks have increasingly become intermediaries for interbank transactions, as witnessed by the sharp increase in the size of their balance sheets (the size of the Eurosystem's balance sheet, for example, had temporarily almost doubled, compared with early 2007). Especially since the introduction of fixed rate tenders with full allotment in the Eurosystem's weekly refinancing operations, coupled with a narrower corridor for standing facilities, banks have been borrowing very large amounts in the Eurosystem refinancing operations. At the same time, banks have significantly increased their recourse to the regular deposit facility offered by the Eurosystem. Depositing with, and lending from, central banks has thus to some extent replaced interbank trading. More recently, at the beginning of 2009, the Eurosystem widened the corridor between its standing facility rates again, in an effort to reduce its intermediation role and to revive the interbank market.

## RESEARCH ON INTERBANK MARKETS: SOME BACKGROUND

The research on which this special feature is based relates to a recent and growing literature that identifies potential sources of inefficiencies in the interbank market and examines the appropriate policy interventions to mitigate them. One possible friction is imperfect competition.[4] Market power can make it possible for liquidity-rich banks to extract surpluses from banks that need liquidity to keep funding projects, which results in an inefficient allocation of resources. The role of a central bank would then be to provide an outside option for the banks suffering from a liquidity squeeze.

A second potential friction in interbank markets could arise if banks are subject to aggregate liquidity shocks, in addition to idiosyncratic liquidity shocks.[5] Whereas interbank markets are well equipped to deal with the latter, difficulties can emerge with the former. Aggregate shocks can lead to volatile prices, even in secured interbank markets. In order to insure against such volatility, banks may want to hold excess liquidity, which is inefficient, as this implies passing up on profitable investment opportunities. Using open market operations, a central bank can commit to withdrawing excess liquidity in the event of low aggregate liquidity shocks, and to providing liquidity to the banking sector in the event of high aggregate liquidity shocks. A third source of inefficiency is the existence of multiple equilibria in interbank markets, some of which are more efficient than others.[6] By steering interest rates, a central bank can act as a coordination device for market participants and ensure that a more efficient equilibrium is reached.

The analysis in this special feature adds asymmetric information about counterparty risk to the list of possible frictions.[7] Asymmetric information has been singled out by commentators, market participants and policy-makers as an important ingredient in the breakdown of interbank markets.[8] For example, it has been argued that it is important to distinguish between general uncertainty and asymmetric information when examining their

5 V. Acharya, D. Gromb and T. Yorulmazer, "Imperfect competition in the interbank market for liquidity as a rationale for central banking", *London Business School Working Paper*, 2008.

6 F. Allen, E. Carletti and D. Gale, "Interbank market liquidity and central bank intervention", *Journal of Monetary Economics,* forthcoming.

7 X. Freixas, A. Martin and D. Skeie, "Bank liquidity, interbank markets and monetary policy", *Federal Reserve Bank of New York Working Paper*, 2008.

8 D. Greenlaw, J. Hatzius, A. Kashyap and H. Shin, "Leveraged losses: lessons from the mortgage market meltdown", *U.S. Monetary Policy Forum Report No.2*, 2008; J. Danielsson and C. de Vries, "Money market on strike", *Financial Times*, 9 November 2008; and N. Cassola, C. Holthausen and F. Würtz , "The 2007/2008 experience of the European Central Bank", paper presented at the FRB Chicago and ECB Conference on "The Credit Market Turmoil of 2007-08: Implications for Public Policy", November 2008.

role in the dynamics and scope of the turmoil, as well as in the transmission of the original shocks in the US sub-prime market across the financial sector.[9] Moreover, under asymmetric information, monetary transmission may not be solely based on the interest rate channel, but may also depend on a rationing channel. When monetary policy tightens, bank deposits decline and banks with less liquid balance sheets may additionally be rationed in the interbank market. Both effects reinforce each other and lead to a reduction in bank lending.[10]

## THE ROLE OF COUNTERPARTY RISK

Asymmetric information about counterparty risk can generate various regimes in the unsecured interbank market, akin to those observed before and during the current financial crisis. In the first regime, borrowers and lenders participate fully in the interbank market, despite asymmetric information. There is no impairment to the market functioning. In the second regime, the interbank market is characterised by adverse selection. There is still borrowing and lending in the market. However, safer banks in need of liquidity find the interest rate too high and prefer to obtain liquidity elsewhere. The interest rate rises to reflect the fact that only riskier banks are continuing to borrow in the unsecured market. In the third regime, the interbank market breaks down. This happens either because lenders prefer to hoard liquidity instead of lending it to an adverse selection of borrowers (lack of supply), or because even riskier borrowers find the interest rate too high to borrow (lack of demand).

The analysis has a number of building blocks. First of all, the business of banks is assumed to be maturity transformation, i.e. banks take in deposits and use these funds to make loans. Loans are illiquid investments in that the return on the investment will be low if a bank needs to call in a loan prematurely. As deposits can be withdrawn on demand, banks also hold some liquidity buffers in order to be able to repay depositors. However, there is uncertainty about the demand for withdrawals a bank will face, with some banks having high levels of withdrawals and others having low levels. This uncertainty, also known as idiosyncratic liquidity shocks, motivates banks' trading in the interbank market. Banks with a liquidity shortage can borrow from banks that have a surplus of liquidity. Lending in the interbank market is not risk-free, since banks' illiquid investments are risky. Banks whose investments fail to produce good returns may well find it difficult to repay interbank loans. Lenders anticipate this, and charge a risk premium for the part of the interbank transaction that is not secured.[11]

Whenever possible, banks prefer to manage their liquidity needs in the interbank market rather than calling in loans. However, asymmetric information about the risk of illiquid investment can impair the functioning of the interbank market. Suppose that a bank knows more about the risk of its own investments than about the investments of other banks, and vice versa. Then, banks have private information about their own ability to pay back interbank loans: there is asymmetric information about counterparty risk. An example of such a situation would be that some banks are holding sub-prime assets with a default probability of, say, 10%, while holdings of other banks have a default probability of 30%. Even though the average probability of default in the economy is known to be 20% and there is no underestimation of risk on average, counterparties cannot distinguish between banks with safer and banks with riskier investments.

Both safer and riskier banks may face high demand for withdrawals, and would thus like to borrow in the interbank market. However, riskier banks impose an externality on banks with safer investments. Lenders in the interbank market know that they are imperfectly

9 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*, June 2008.

10 X. Freixas and J. Jorge, "The role of interbank markets in monetary policy: a model with rationing", *Journal of Money, Credit and Banking*, Vol. 40, No 6, September 2008.

11 In order to clearly spell out the role of counterparty risk in the interbank market, the analysis abstracts from aggregate liquidity shocks, i.e. shocks affecting the liquidity needs of all banks at the same time.

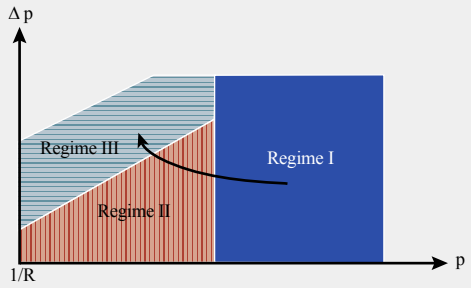
informed about counterparty risk and protect themselves by charging a risk premium based on the average level of counterparty risk, i.e. banks with safer investments subsidise the cost of liquidity of banks with relatively riskier investments. There will be a point when the cost of the subsidy will be higher than the cost of obtaining liquidity outside the unsecured interbank market. Since banks with safer investments hold better-quality assets, they have better options for obtaining liquidity elsewhere. Thus, they are the first to leave the unsecured market if the interest rate becomes too high. It is therefore possible that there is an *adverse selection* of risky borrowers in the unsecured interbank market.

Under adverse selection, the interest rate in the interbank market rises. There are two effects, both of which work to increase the interest rate. First, from the point of view of the lender, counterparty risk is higher. In addition, there is also a composition effect, as only risky banks borrow in the interbank market.

Although the interest rate rises, it does not immediately mean that lenders will want to lend to an adverse selection of borrowers. In particular, if riskier banks are expected to be close to insolvency, then liquidity-rich banks may refuse to lend to such risky borrowers. Instead, they will prefer to store their liquidity, e.g. using cash or a central bank's deposit facility. The interbank market then breaks down due to a lack a supply. Alternatively, the market can also break down due to lack of demand. This occurs when adverse selection causes the interest rate to increase so much that even risky banks find it too expensive to borrow unsecured funds and prefer to get liquidity elsewhere.

To sum up, there are three distinct regimes in the interbank market when there is asymmetric information about counterparty risk: normal times with full participation of safe and risky borrowers (Regime I), adverse selection (participation of risky borrowers only) (Regime II) and market breakdown (Regime III). Chart B.4 illustrates which regime occurs under different parameters

**Chart B.4 Transition between regimes**




Sources: F. Heider, M. Hoerova and C. Holthausen, "Liquidity hoarding and interbank market spreads: the role of counterparty risk", *ECB Working Paper*, forthcoming.
Note: The chart shows which regime occurs under different values for average counterparty risk, p, and the dispersion of counterparty risk, Δp. A higher value of p indicates a lower amount of counterparty risk, and vice versa. The figure is drawn for levels of counterparty risk such that the expected net return on bank loans is positive, i.e. p remains above 1/R where R stands for the return on bank loans.

for average counterparty risk (the horizontal axis), and the dispersion of counterparty risk, i.e. the difference in the probability of default between safer and riskier banks (the vertical axis).

When the average level of counterparty risk is low, there is full participation in the interbank market (Regime I), regardless of the dispersion of counterparty risk. Asymmetric information about the risk of illiquid investments does not impair the functioning of the interbank market as long as the overall level of risk is low. Once the average counterparty risk rises, driving up the interest rate in the interbank market beyond a certain threshold, safer banks with a liquidity shortage prefer to get liquidity elsewhere. Only an adverse selection of riskier banks keeps borrowing, causing the interest rate to increase even further. Once there is adverse selection in the interbank market (Regime II), the dispersion of counterparty risk matters. Good risks and bad risks no longer cancel each other out in the market. An increase in the dispersion of risk alone, without an increase in the level of risk, can lead to a breakdown of the interbank market and the hoarding of liquidity.

The arrow in Chart B.4 depicts a change in the level and the dispersion of counterparty risk

and a corresponding transition between regimes that echoes the experience of interbank markets before and during the financial crisis of 2007-09. As explained in Chart B.1, three different phases seem to characterise the situation in the interbank market: (i) normal times, (ii) elevated spreads, but no recourse to the ECB deposit facility, and (iii) further increase in spreads with a substantial depositing of funds overnight with the ECB. The phases resemble the different regimes described above. Moreover, the transition across regimes implies a change in the underlying level and dispersion of counterparty risk that is consistent with the development of actual events. First, the transition from Regime I to Regime II occurred at the start of the crisis in August 2007. At that time, sub-prime mortgage-backed securities were discovered in portfolios of banks and bank-sponsored conduits, leading to a reassessment of the level of risk. The extent of exposures was unknown and counterparties could not distinguish safe from risky banks.

Since the onset of the crisis in August 2007, the money market has also become two-tiered, with banks in possession of high-quality (i.e. safe) collateral being able to attract funds at relatively low rates in the repo market, while second-tier (riskier) banks are having difficulties in attracting funds even at higher rates. It appears that not all banks have been equally impacted by credit risk concerns, which corresponds well to the notion of adverse selection.

The transition from Regime II to Regime III occurred at the moment of the dramatic events surrounding the last weekend of September 2008. Before the weekend, Washington Mutual, the largest savings and loan (S&L) institution in the United States, was seized by the Federal Deposit Insurance Corporation (FDIC) and sold to JPMorgan Chase. At the same time, negotiations on the Troubled Asset Relief Program (TARP) rescue package stalled in the US Congress. Over the weekend, it was reported that the crisis had spread to Europe, affecting some banks. These events were signs of the financial crisis spreading outside the realm of investment banking and into the global financial system. They could be interpreted as a further increase in the level and, possibly, dispersion of counterparty risk.

## POLICY RESPONSES

A number of policy interventions were discussed and implemented to deal with the strains observed in the interbank markets since August 2007, strains that posed a threat to financial stability. In this section, several policy interventions are briefly discussed in the light of the arguments above.

The presence of riskier banks in the interbank market can drive up interest rates. Since lenders cannot distinguish between safer and riskier banks, this imposes an externality on safer banks. Central banks can mitigate this by offering ample liquidity to all banks. In order to have a balanced intervention, the central bank can also offer to accept deposits from banks with excess liquidity and possibly remunerate them. The central bank would effectively become an intermediary. It would be the counterparty for all liquidity transactions, replacing the interbank market.

Interbank market guarantees were also discussed as a policy intervention, the aim of which would be to encourage banks to lend to each other. Depending on their scope, guarantees reduce or even eliminate counterparty risk, thus lowering the interbank interest rate. Lower interest rates in turn induce safer banks to borrow again in the interbank market.

At the same time, there are ongoing discussions on regulatory policies, which would help prevent future tensions in the interbank market, and thus promote financial stability. In this context, imposing minimal liquidity requirements on banks has been mentioned. These ensure that banks hold high enough liquidity buffers, which in turn lowers the price of liquidity in the interbank market and encourages full participation. The drawback is that banks are forced to hold more

liquidity and forego part of the return on the profitable illiquid investment. This introduces a distortion into banks' investment decisions.

Finally, enhancing market transparency could prevent future interbank market stress. It would reduce the asymmetry of information and enable lenders to better distinguish between safer and riskier borrowers.

## CONCLUDING REMARKS

The failure of the interbank market to redistribute liquidity has become a key feature of the financial crisis. This special feature focuses on the role of counterparty risk as one of the factors affecting the functioning of the unsecured interbank markets and posing a threat to financial stability. The analysis suggests that asymmetric information about counterparty risk can generate various regimes in the interbank market, akin to those observed in the interbank markets before and during the current financial crisis. Against this background, the effects of various policy interventions are analysed.

## C BALANCE SHEET CONTAGION AND THE TRANSMISSION OF RISK IN THE EURO AREA FINANCIAL SYSTEM

*The identification of vulnerabilities, trigger events and channels of transmission is a fundamental element of financial stability analysis. Using data for the euro area, this article combines measures of leverage and volatility with interlinked balance sheets to show how local financial shocks can spread through the financial system and affect balance sheets and risk exposures in other parts of the system. Analysis of this network of interlinked assets and liabilities leads to the conclusion that the cross-sector balance sheet exposures in the euro area financial system constitute important channels through which shocks can be transmitted across sectors. High financial leverage and elevated asset volatility are key factors in increasing a sector's vulnerability to shocks and contagion.*

### INTRODUCTION

Assessing financial stability involves identifying risks and vulnerabilities in the various parts of the financial system. It also calls for the recognition of potential trigger events which could, if they materialise, flip the state of the financial system from stability to instability. Financial stability analysis should also aim at identifying the channels through which shocks may spread more widely across the financial system, possibly affecting parts of the system that might not have been considered particularly vulnerable to the initial shock, but may nevertheless be adversely affected owing to their close interconnection with sectors that are directly confronted by the unforeseen events.

The financial crisis has highlighted the particular need for a framework that can capture the interlinkages between sectors.[1] In order to conceptualise such a framework, measures are needed that can capture the accumulation of imbalances and the transmission of local balance sheet dislocations. This article uses data on the euro area financial accounts to construct a network of balance sheet exposures that connect the main sectors of the euro area financial system. The analysis focuses on measures of leverage, which is a key indicator of balance sheet vulnerability owing to its ability to increase the sensitivity of agents' net financial wealth positions to changes in cash flows and asset prices. The article goes on to show how shocks to some parts of the financial system can affect net financial wealth positions in other parts of the network. Finally, it illustrates how the network of leveraged exposures can be combined with data on asset returns and asset volatility to provide measures of risk exposures for individual sectors.

### SECTOR-LEVEL BALANCE SHEETS IN THE EURO AREA FINANCIAL SYSTEM

In this special feature, the euro area financial system is considered as a closely intertwined group of seven distinct sectors: households, non-financial corporations (NFCs), banks and other monetary financial institutions (MFIs), insurance companies, other financial intermediaries (OFIs), government and the rest of the world (RoW). The data used to construct the sector-level balance sheets are from the ECB's euro area accounts. In these euro area accounts, the analytical grouping of economic agents into institutional sectors and transactions is based on the methodological framework established in the European System of Accounts 1995 (ESA 95).[2]

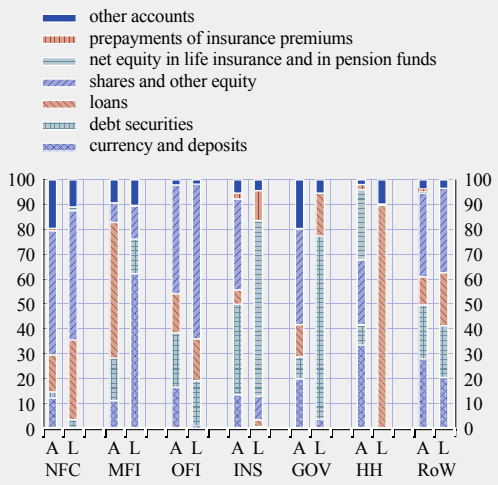
Chart C.1 illustrates the composition of the balance sheets (assets and liabilities) of the seven sectors as at the end of the third quarter of 2008. The categories of financial instruments included in the balance sheets are those used in the

1 Indeed, recent policy advice issued by international committees, which includes recommendations for European financial supervision, have suggested that systemic risk indicators should be developed. See, for example, O. Issing et al., "New Financial Order" *Recommendations of the Issing Committee*, 2009; UK Financial Services Authority, *The Turner Review*, 2009; and J. De Larosiere et al., "Report", *The high-level group on financial supervision in the EU,* 2009.

2 For more details, see http://forum.europa.eu.int/irc/dsis/nfaccount/info/data/esa95/en/titelen.htm. The ESA 95 is the European application of the System of National Accounts 1993 (SNA 93).

**Chart C.1 The composition of sector-specific balance sheets in the euro area financial system**

(Q3 2008; A = financial assets; L = financial liabilities)




Source: ECB.
Note: NFC stands for the non-financial corporations sector, MFI for the monetary financial institutions sector, OFI for the other financial intermediaries sector, INS for the insurance sector, GOV for the government sector, HH for the households sector and RoW for the rest of the world.

ESA 95 statistics, which are classified according to liquidity factors and legal characteristics.

For most sectors, the asset sides of the financial account balance sheets consist of holdings, in different proportions, of cash and money market instruments, as well as debt and equity securities issued by financial and non-financial firms. Several sectors (notably MFIs, but also NFCs and OFIs) are also large issuers of loans to the other sectors. There are also smaller asset items, such as pre-payments of insurance premiums and net equity in life insurance and pension funds. Owing to the inclusion of the RoW sector, these asset holdings include instruments originated by both domestic and foreign counterparties.

In contrast to the asset holdings, the sector-specific liability positions show more distinct characteristics. The liabilities of the NFC sector consist of loans from banks and other firms, as well as equity and debt securities issued to other firms and other sectors in the financial system. For banks (MFIs), the liabilities are currency and deposits collected from other banks and from the private sector, as well as stocks and bonds issued to investors in the other sectors. The bulk of the OFI sector's liabilities are mutual fund shares, while the largest share of the insurance sector's liabilities is made up of net equity of households in life insurance cover and pension funds. For government, government bonds account for the largest share of liabilities, most of which are denominated in the domestic currency in developed economies. Household sector liabilities are accounted for almost entirely by MFI loans to finance housing and consumption expenditure. Finally, for the rest of the world, both sides of the balance sheet are rather evenly split between cash, loans and investment securities.

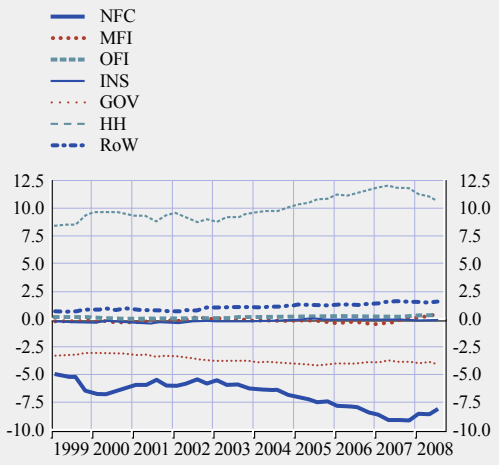
## LEVERAGE AS A MEASURE OF FINANCIAL FRAGILITY

Although the assets must equal liabilities at the system level in an integrated financial system like the ECB's euro area accounts, this is not necessarily the case at the sector level. Indeed, some sectors in the financial system show systematic deficits in their financial accounts, while others report systematic surpluses. The NFC and government sectors typically (although not always) belong to the former category, while households form the largest part of the latter category. Insofar as the deficits run by the borrowing sectors exceed the surpluses recorded by the lending sectors, the gap must be financed by borrowing from abroad. There is therefore a need for an RoW sector, whose financial position mirrors the current account of the balance of payments of the domestic financial system.

The difference between a sector's financial assets and liabilities equals that sector's net financial wealth. Chart C.2 illustrates the evolution over time of the net financial wealth positions of the sectors of the euro area financial system. In the euro area, the positive net financial wealth of the surplus sectors (mainly households and the rest of the world) matches the negative net financial wealth of the deficit sectors (mainly the government sector and

**Chart C.2 Evolution of sector-level net financial wealth in the euro area financial system**

(Q1 1999 – Q3 2008; EUR trillions)




Source: ECB.
Notes: Net financial wealth is defined as total financial assets minus total liabilities. For the explanation of the abbreviations used, see the note in Chart C.1.

non-financial corporations). It is noteworthy that the net financial wealth of the financial sectors is small. This reflects the fact that, as financial intermediaries, the bulk of their assets and liabilities consist of financial instruments, and that their holdings of non-financial assets such as real estate and capital goods are relatively insignificant.

Net financial wealth and its role in attributing sectors to the borrowers or lenders in the financial system also provides a link between the financial and the real accounts. Therefore, it allows an analysis of the transmission of "vertical" contagion whereby shocks may spread from the real sector to the financial sector via the net lending positions of the different sectors.[3]

From the financial stability perspective, the concept of net financial wealth provides an insight into how indebtedness and leverage can increase the vulnerability of a sector to cash flow and asset price shocks. This can be illustrated using the following intertemporal identity, which equates a sector's future financial assets position $(A_{t+1})$ with the difference between the current market value of assets $(P^A A_t)$ and liabilities $(D_t)$ plus the flow return on the assets $(RoA)$.

$$A_{t+1} = \frac{RoA + (P^A \cdot A_t) - D_t}{P^A} \quad (1)$$

Importantly, if the stock of debt outstanding is large relative to the flow return on assets, then the net wealth (the nominator in equation 1) is more sensitive to fluctuations in asset prices $(P^A)$. In other words, sectors with high debt relative to cash flows tend to be more vulnerable to asset price and cash flow shocks. This captures the "leverage effect" of debt accumulation, which is an important concept in financial contagion literature.

Constructing a comparable measure of leverage for different sectors is complicated somewhat by the above-mentioned differences in the composition of the liability sides of the balance sheets. Chart C.3 provides a measure of debt-to-asset ratios for the individual sectors, where debt is defined as total liabilities minus shareholder equity and net financial wealth.

Leverage increased for euro area non-financial corporations in the run-up to the stock market crash in 2000-01 and then broadly declined, before starting to increase again from mid-2007. For the euro area household sector, financial leverage has increased steadily over the period under review, although the ratio remains low, equalling around one-third of the corporate sector leverage on this particular measure.[4]

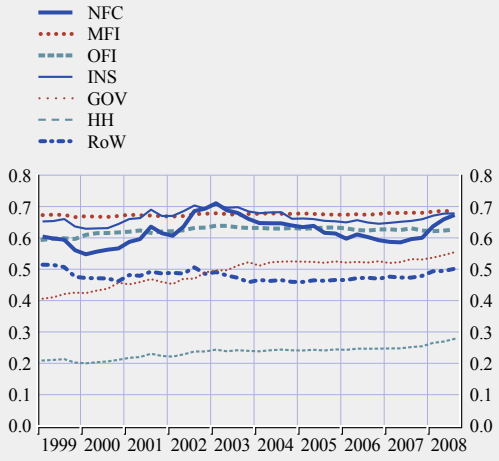
The leverage of the banking sector has remained rather stable, which is consistent with the notion that banks tend to target constant leverage ratios over time as they strive to minimise fluctuations

3 More specifically, net wealth (a measure of stocks) can be defined as accumulated lending or borrowing (flow measures), including changes in prices and other components. The net lending/borrowing of a sector can be decomposed into investment (gross capital formation) and saving. Therefore, shocks to savings and investment are conveyed to the financial accounts via their impact on the flows of net lending and, thus, on the net wealth position.

4 However, there are important differences across Member States in this respect.

**Chart C.3 Sector-level measures of leverage in the euro area financial system**

(Q1 1999 – Q3 2008)




Source: ECB.
Notes: Leverage is defined as debt over market value of financial assets. For the explanation of the abbreviations used, see the note in Chart C.1.

in their regulatory capital and credit ratings.[5] Regarding insurance companies, leverage increased in the period 2001-03, as the decline in the euro area equity markets caused a sharp drop in the market value of their financial assets. This was followed by a period of balance sheet deleveraging and, subsequently, by a gradual increase in the leverage ratio since 2007.

## A NETWORK OF BALANCE SHEET EXPOSURES FOR THE EURO AREA FINANCIAL SYSTEM

The financial accounts in the ECB's euro area accounts do not currently provide detailed information on the specific counterparties of the instruments issued by a given sector (the "who-to-whom" accounts).[6] In the absence of this information, the balance sheet linkages between sectors can be estimated using statistical techniques. More specifically, when the aggregate asset (liability) holdings of each sector are known on an instrument-by-instrument basis, the allocation of these aggregate holdings across the liabilities (assets) of all other sectors can be approximated using the maximum entropy technique, which exploits the relative shares of the sectoral total assets and liabilities. In other words, the who-to-whom detail is approximated to follow the distribution of assets and liabilities. The use of this assumption is standard in statistical exercises and in the literature on financial contagion.[7]

Once the bilateral exposures have been calculated, a network connecting all sectors in the financial system can be constructed. Chart C.4 illustrates this network of balance sheet exposures for the euro area financial system at two distinct points in time, namely in the first quarter of 1999 and in the third quarter of 2008. The lines in the charts show the gross exposures, i.e. the sums of exposures on the asset and the liability sides between two sectors. The thickness of the line connecting two sectors is commensurate with the magnitude of the gross exposure, while the sizes of the circles describe the exposures within sectors. The latter include, among other items, cross-shareholdings of firms, intercompany loans and interbank credit exposures.

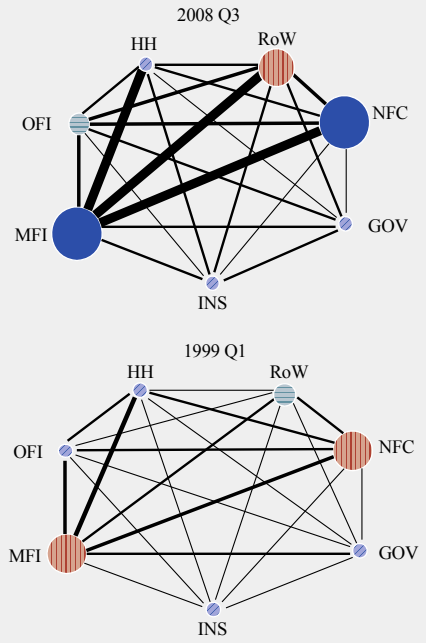
Three main observations can be drawn from Chart C.4. The first is the overall increase in the size of balance sheet exposures in the first decade of Stage Three of Economic and Monetary Union. The second is the crucial role played by the banking (MFI) sector in

5 See T. Adrian and H. Shin "Liquidity and Leverage", *Federal Reserve Bank of New York Staff Report*, No 328, 2008. Consistent with their findings, when plotting the changes in leverage against changes in total assets for the different sectors on the basis of data from the ECB's euro area accounts, it can be noted that, in the euro area, all sectors except the MFI and OFI sectors show a negative relationship. This suggests that for the non-financial sectors and insurance companies, leverage ratios adjust passively, i.e. the ratios fall when the denominator (financial assets) increases. By contrast, the MFI and OFI sectors actively manage their leverage ratios by increasing (decreasing) debt when assets increase (decrease), mainly reflecting common risk management strategies that call for constant leverage across the cycle.

6 This situation is expected to improve with the implementation of "who-to-whom" statistics in the coming years.

7 See, for example, C. Upper and A. Worms "Estimating bilateral exposures in the German interbank market: is there a danger of contagion?" *European Economic Review,* 2004; I. van Lelyveld and F Liedorp "Interbank contagion in the Dutch banking sector: a sensitivity analysis", *International Journal of Central Banking,* 2006, and S. Wells "Financial interlinkages in the UK interbank market and the risk of contagion," *Bank of England Working Paper*, No 230, 2004.

**Chart C.4 Cross-sector balance sheet exposures of the euro area financial system**




Sources: ECB and ECB calculations.
Notes: The thickness of the lines shows the size of the gross balance sheet exposures (assets plus liabilities) between two sectors. The size of the circle illustrates the amount of gross exposures within sectors. For the explanation of the abbreviations used, see the note in Chart C.1.

the euro area financial system. As a financial intermediary, it holds liabilities in the form of deposits from mainly the household, NFC and RoW sectors, while it holds assets in the form of loans extended predominantly to these same sectors. In addition, the MFI sector also plays an important role in securities markets, as it issues equity and debt securities mainly to the household, insurance, OFI and RoW sectors, and holds securities issued mainly by the NFC, OFI, government and RoW sectors. The third observation is the growing role played by the OFI sector over the past ten years. While the bulk of the sector in the euro area consists of money market funds, its growth also reflects the expansion of securitisation transactions and off-balance-sheet structures.

Overall, it is evident from the above that potential stresses in the MFI sector have substantial negative spill-over effects into virtually all other sectors in the euro area financial system, while the MFI sector is vulnerable to contagion especially from the household, NFC, RoW and OFI sectors, as well from the interbank credit market within the MFI sector itself.

## TRANSMISSION OF SHOCKS IN THE NETWORK VIA BALANCE SHEET EXPOSURES

From the financial stability perspective, the network of financial exposures outlined in Chart C.4 can be used to analyse how shocks to some sectors may cause a "horizontal" chain reaction in the network, whereby the other sectors may also see their financial positions adversely affected. The analysis below is inspired by the literature on credit chains and balance sheet contagion, which provides the theoretical underpinnings of shock transmission in the financial system.[8]

Shocks to the cash flows of the non-financial corporate sector are analysed below using the ECB's euro area accounts data for the third quarter of 2008. More specifically, it is assumed that the NFC sector faces a negative earnings shock that is large enough to cause a 20% drop in the value of shareholder equity.[9] For the sake of simplicity, it is also assumed that there are no further changes in cash flows in any other sectors in any future period and that all sectors must mark their investment losses to market. These rather restrictive assumptions nevertheless help to reveal the precise transmission of the shock over time and across sectors.[10]

Table C.1 shows the result of this simple exercise. It suggests that, overall, in terms of the negative impact on financial assets owing to the loss of value in investment in other sectors' equity, the

8 See F. Allen and D. Gale "Financial contagion", *Journal of Political Economy,* 2000, N. Kiyotaki and J. Moore "Credit Cycles", *Journal of Political Economy,* 1997, and N. Kiyotaki and J. Moore "Balance Sheet Contagion", *American Economic Review,* 2002.

9 Alternatively, the shock can be assigned to the asset prices, as shown in equation 1 above.

10 Note that since the euro area accounts are a closed system, the shock persists indefinitely unless it is assumed that future positive cash flows in some sector can offset the losses.

**Table C.1 Simulated transmission of a shock to non-financial corporations' cash flows**

(Q3 2008; percentage changes in financial assets)

| | Round | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | Average |
| NFC | 5.41 | 5.99 | 6.15 | 5.85 |
| HH | 1.88 | 2.03 | 2.00 | 1.97 |
| MFI | 0.85 | 0.86 | 0.84 | 0.85 |
| INS | 1.99 | 0.31 | 0.31 | 0.87 |
| OFI | 4.14 | 4.54 | 4.55 | 4.41 |
| GOVT | 3.98 | 4.38 | 4.35 | 4.24 |
| ROW | 1.80 | 1.93 | 1.86 | 1.86 |

Sources: ECB and ECB calculations.
Note: For the explanation of the abbreviations used, see the note in Chart C.1.

percentage impact on individual sectors is highest within the non-financial sector itself, as well as in the OFI and government sectors. This mainly reflects the large holdings by these sectors of non-financial corporate sector shares. However, the scale of the further impact of the shock also differs across sectors over time. In particular, the fact that in the later rounds a sector may be affected by valuation losses from other sectors to which it has large exposures means that the intensity of the shock may change over time. Indeed, Table C.1 shows that the second round of the impact has a stronger impact than the first round for almost all sectors except the insurance sector. The latter sector is relatively less affected by losses in the valuation of equity issued by sectors other than the NFC sector.[11]

Finally, the fact that the financial asset positions of all the other sectors deteriorate as a result of the shock to an individual sector means that, overall, measures of leverage will increase. This may introduce further dynamics into the process if the affected sectors try to keep their leverage ratios constant and reduce their liabilities to accommodate the losses on their asset holdings.

## RISK EXPOSURES AND THE TRANSMISSION OF RISK IN THE FINANCIAL SYSTEM

The identification of imbalances using sector-specific balance sheets and the illustration of the propagation of shocks via the network of exposures are useful tools for financial stability analysis. However, since the presentation above is based on a purely deterministic framework, it is not possible to say anything about the accumulation and transmission of *risk exposures*. To incorporate such characteristics, the analysis has to be extended by using tools that also capture the volatility of the key balance sheet items, such as shareholder equity and assets. In this way, it is possible to quantify the uncertainty, or risk, involved in the leveraged positions.

Recent contributions to contingent claims analysis extend tools originally developed for assessing firm-level default risk at the macro-financial level and can provide insight into the measurement of sector-level risk exposures.[12] Contingent claims analysis is based on structural finance models, which use options pricing theory and include as inputs data on leverage, interest rates, the market value of assets, asset returns and asset volatility.[13] The output consists of the optimal debt-equity structure of the firm plus a number of risk indicators, such as the distance to distress, the expected loss, the probability of distress, the expected recovery rate and the credit spread over the risk-free interest rate. While some of these indicators are available for selected financial and non-financial firms from various private data sources, their availability for other sectors such as households, government and OFIs is far more limited.

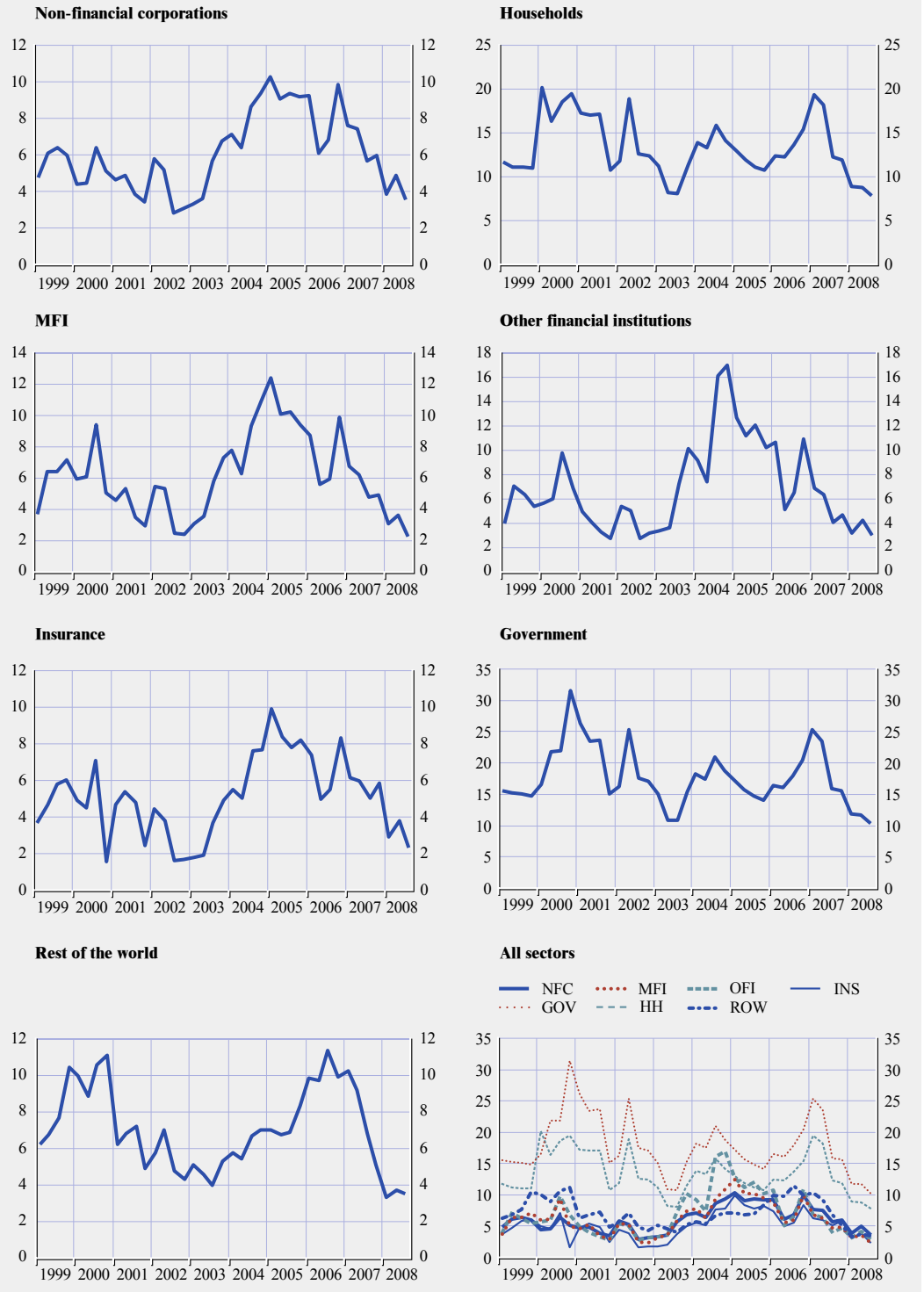
The fact that the euro area accounts provide a consistent source of leverage measures across different sectors makes it possible to construct time series for risk indicators at the sector level. It should be stressed from the outset, however, that

11 Note that the contagion impact to other sectors is in this case dependent on the size of the cross-exposure in equity holdings, which may not be in proportion to the aggregate cross-exposure between sectors as shown in Chart C.4.

12 See D. Gray, R. Merton and Z. Bodie, "A New Framework for Analysing and Managing Macrofinancial Risks of an Economy", *NBER Working Paper*, No 12637, 2006, and D. Gray and S. Malone, "Macrofinancial Risk Analyis" *Wiley Finance, UK,* 2008.

13 These analyses mostly derive from the classic paper by R. Merton, "On the Pricing of Corporate Debt: the Risk Structure of Interest Rates", *Journal of Finance,* 1974.

## Chart C.5 Sector-level distances to distress for the euro area financial system




Source: ECB.
Note: The scales on the y-axes measure the distance, in standard deviations, between the market value of assets and the default point.

the interpretation of these indicators is not straightforward for two reasons. First, the liability structure of many of the sectors differs from the liability structure of the firm sector for which the relevant models were originally developed. Second, the risk measures should not be understood as reflecting, for example, the probability of distress or expected loss given financial distress of an entire sector (which is likely to be very close to zero anyway), but rather the risks faced by a representative agent in that sector.[14] Bearing in mind these caveats, the dynamics of the indicators can nonetheless provide useful and timely signals on changes in individual sectors' risk exposures and how they can spread to other sectors in the financial system.

Using the sector-level balance sheet data on leveraged exposures from the euro area accounts and market data on volatilities, interest rates and the market price of risk as inputs, contingent claims analysis can be applied to calculate the risk indicators. By way of example, Chart C.5 depicts the evolution of the distance to distress for the different sectors in the euro area financial system from the first quarter of 1999 to the third quarter of 2008. The distance to distress measures the distance of a sector's market value of assets from the level of liabilities (the distress point). The impact of the financial sector turmoil that started in the second half of 2007 and intensified in the second half of 2008 resulted in a marked decrease in the distances to distress in all sectors, most notably in the banking (MFI) sector and the other financial sectors. This decrease started from the high level of distances to distress (i.e. low perception of distress risk) that had prevailed throughout the years before the turmoil, mainly driven by the very moderate levels of asset volatility observed in all sectors.

Despite of the rather sharp decline in distances to distress since the third quarter of 2007, the distances to distress for many sectors still remain above the troughs reached during the previous episode of financial turmoil after the bursting of the "new economy" stock market bubble. This holds particularly true for the NFC sector and reflects, on the one hand, the fact that the epicentre of the turmoil remained in the financial sector until late 2008 and, on the other, the fact that leverage among euro area non-financial firms was relatively low prior to the eruption of the financial stresses in August 2007.

**Table C.2 Simulated transmission of shocks on distances to distress**

(Q3 2008; in percentage)

| | Decrease in distance-to-distress |
|---|---|
| NFC | 3.70 |
| HH | 0.20 |
| MFI | 0.30 |
| INS | 7.00 |
| OFI | 2.52 |
| GOV | 0.10 |
| ROW | 0.20 |

Source: ECB calculations.
Notes: The shock scenario is the same as that applied in Table C.1. For the explanation of the abbreviations used, see the note in Chart C.1.

Table C.2 shows the simulated impact on the sector-level distances to distress of the first-round shock applied in the balance sheet contagion analysis above. The shock that was assumed to materialise in the third quarter of 2008 would have caused the distances to distress to increase by between 2.5% and 7% in the OFI, insurance and NFC sectors. The impact on the risk indicators in the other sectors would have remained more muted, reflecting either low leverage (in the household sector) or an already increased level of risk (in the RoW sector).[15]

## CONCLUDING REMARKS

This article used the data from the euro area accounts to construct a type of "systemic risk map" that illustrates how financial shocks are transmitted across sectors within the

14 It should also be noted that, in general, the level of default risk among households, for example, is a tiny fraction of that among non-financial corporations, owing to the much higher leverage and asset volatility in the latter sector.

15 An important mitigating factor with respect to the observed increase in risk is that, for the sake of simplicity, asset volatility of the affected sectors is assumed to remain unchanged. In practice, asset volatility typically increases quite sharply during periods of stress, which would push the distances to distress further down, possibly substantially so.

euro area financial system. The network of leveraged exposures was then combined with a contingent claims analysis, which introduces an additional channel of transmission that traces the propagation of risk in the financial system. What is important is that this final step makes it possible to produce indicators for risk exposure and risk contagion at the sector level. Analysis of balance sheet and risk networks is especially useful for macroprudential purposes, where attention should be paid to the vulnerabilities that arise from the interlinkages among agents in the financial system. In particular, these types of tools allow the early identification of risks that may not be easily recognisable when the focus of the analysis is only on measures of leverage and volatility within individual sectors.

## D ESTIMATING PROBABILITIES OF HEDGE FUND LIQUIDATION

*A failure of an individual hedge fund or a group of hedge funds can have adverse implications for financial stability, mainly through an impact on asset prices and market liquidity and through potential losses for the hedge funds' creditors. Therefore, it is important to understand the underlying reasons behind hedge fund failures and to create indicators that would allow strains in the hedge fund sector to be monitored. To this end, this special feature focuses on cases of hedge fund liquidation and estimates the main factors that could point to a higher liquidation risk, using a panel logit analysis. On the basis of the estimation results, a composite indicator is proposed, which shows that the probabilities of hedge fund liquidation increased substantially in 2008 and remained elevated at the beginning of 2009.*

### INTRODUCTION

This special feature represents a continuation of the work on hedge fund failures that was presented in several previous issues of the Financial Stability Review (FSR).[1] Its purpose is to gauge the factors that are useful in predicting hedge fund failures and to create, on the basis of the results of such analysis, a composite indicator of hedge fund liquidation risk.

A hedge fund failure is a relatively broad term. For investors and creditors, it constitutes a loss on their investments and credit exposures, whereas it represents a failed asset management venture for the hedge fund manager. However, a failure may not necessarily involve the loss of all investor capital or losses for the hedge fund's creditors. Therefore, it is important to distinguish between different types of hedge fund closures.

Owing to the lack of good data and the frequent interplay of several factors behind hedge fund failures, any classification and ranking of the main underlying causes is somewhat arbitrary. Nevertheless, the majority of hedge funds probably close primarily because they are losing investors, money or both. However, start-up hedge funds may opt to discontinue their operations predominantly on account of unsuccessful fund-raising efforts, since too small an investor capital base does not yield a sufficient flow of fee income and the benefits of economies of scale cannot be reaped.

In addition to such business-driven reasons, there is some evidence that hedge funds also often shut down on account of operational risk factors, such as the misrepresentation of investments, a misappropriation of funds/general fraud, unauthorised trading and style breaches, or inadequate resources and infrastructure.[2] The departure of key managers may also lead to the eventual liquidation of a fund.

Finally, there are hedge fund collapses, such as those of LTCM in September 1998, or Amaranth Advisors in September 2006, that may or may not have systemic implications and are of particular relevance for financial stability analysis. The results of a forensic-style ex post examination of such collapses can provide useful lessons for various market participants, but predicting them ex ante using commercially available hedge fund databases, which are the main source of quantitative data on large samples of hedge funds, is a very difficult task.

Whereas exits from databases that are driven by business considerations are more traceable, closures due to operational risk factors or collapses are very hard to identify and predict, not least because of the inadequate scope, quality and completeness of data reported to databases by hedge fund managers. Identifying and predicting such failures may also require some form of indirect, i.e. regression-based, analysis of hedge funds' investment portfolios, which is beyond

1 See Box 6 in ECB, *Financial Stability Review*, June 2007, and ECB, "Net asset value triggers as early warning indicators of hedge fund liquidation", *Financial Stability Review*, December 2007.

2 See S. Feffer and C. Kundro, "Understanding and Mitigating Operational Risk in Hedge Fund Investments", *Capco Institute White Paper Series*, March 2003.

the scope of this study. Nonetheless, some information on, for example, the risk profiles of individual hedge funds might provide useful warning signals of potential problems ahead.

## DATA AND SAMPLE SELECTION

The empirical panel logit analysis of hedge fund closures presented in this special feature is based on information available in the Lipper TASS database, which is probably the most frequently used database for hedge fund attrition analysis, partly because it assigns a status code to hedge funds in its "graveyard" module that is based on attrition types. There are eight status codes: fund liquidated, no longer reporting, unable to contact the fund, fund closed to new investment, merged into another entity, program closed, fund dormant, and unknown.

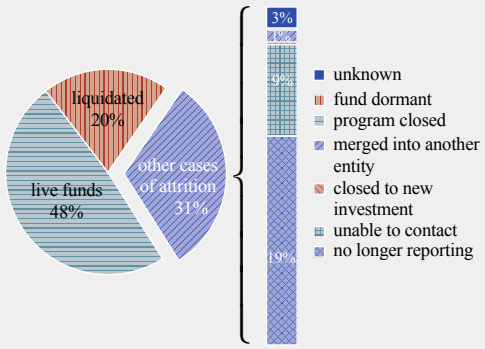
As shown in Chart D.1, liquidation was the most frequent reason why hedge funds had exited the database as at 30 March 2009. The destiny of most other hedge funds that left the database is not known and may not necessarily be linked to the respective fund's closure. Moreover, there is some evidence that survival and hazard functions of liquidated hedge funds differ from those of hedge funds that have stopped reporting for other reasons.[3] Therefore, further analysis is focused on cases of hedge fund liquidation only.

The data sample that was used for the estimation begins in January 1994, because the reasons why hedge funds left the database started to be tracked in that year and because it is also the starting date of the Credit Suisse/Tremont hedge fund indices that were used to benchmark hedge funds' returns. The monthly time series span 14 years and end in December 2007, 15 months before the date on which the database was downloaded (30 March 2009). Hedge funds that had no return data at the end of the sample and that had no graveyard status at the time of the download were treated as non-liquidation exits, and were thus excluded from the analysis.

The details of data filtering steps are depicted in Charts D.2.a and D.2.b, which show that the final unbalanced sample consisted of 1,365 live and liquidated single-manager hedge funds, or 11% of all return time series in the database.[4] Chart D.2.a shows that the isolated impact of some filters was quite considerable. The cumulative impact of all filters applied in the selected sequence is illustrated in Chart D.2.b.

**Chart D.1 Distribution of single-manager hedge fund attrition cases**

(percentage of total investment records in the database as at 30 March 2009)




Sources: Lipper TASS database and ECB calculations.
Note: Excluding funds of hedge funds. Numbers do not add up due to rounding.

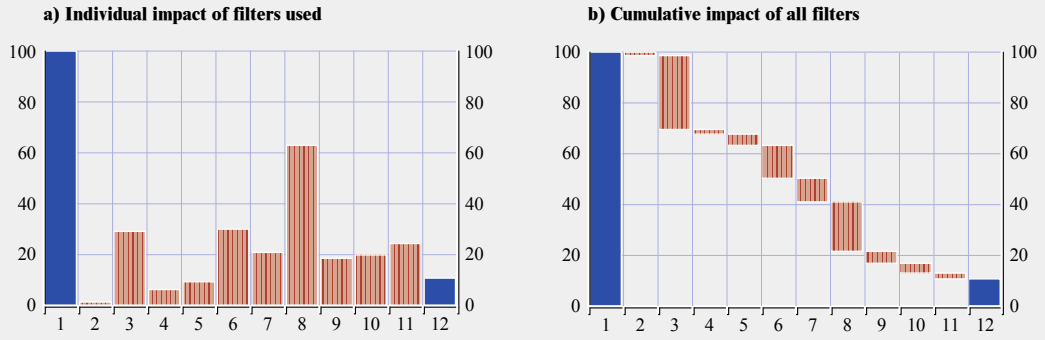
The sample was also cleansed of multiple sub-fund structures that typically represent onshore and offshore versions or separate classes of hedge fund shares (usually differing in the currency of denomination), which basically correspond to the same pool of money managed in highly correlated or nearly identical ways. Taking multiple sub-fund structures into account should yield more robust estimates that would not be biased as a result of varying numbers of sub-funds or their selective listing in the database by hedge fund managers.

Where several sub-fund structures, instead of one fund or sub-fund, were listed in the database, the structure with the largest capital under management was chosen, as measured by the 75th percentile of historical data on the amount of capital under

3 See N. Baba and H. Goko, "Survival Analysis of Hedge Funds", *Bank of Japan Working Paper Series*, No 06-E-05, March 2006.
4 There were 295 (22% of selected funds) liquidation events within the sample period and 81 (6%) took place after the sample period.

**Chart D.2 Data filtering results**

(percentage of investment return time series in the database)




1 12,656 investment records.
2 Undefined strategy, quarterly and other than net-of-fees returns.
3 Fund of funds.
4 Missing or illogical information on management and incentive fees, high-watermark provisions, use of leverage, co-investment.
5 Incomplete information on redemption restrictions.
6 No information on the use of derivatives.
7 Fewer than 18 monthly investment return observations.
8 Insufficient capital-under-management data.
9 Capital under management less than USD 10 million.
10 Non-liquidation exits.
11 Sub-fund structures.
12 Final sample, 1,365 single-manager hedge funds.

Sources: Lipper TASS database and ECB calculations.
Note: "Insufficient capital data" means that were fewer than 13 consecutive capital observations before the fund's last reported returns and, as a result, some fund-specific capital-based variables could not be computed at least once.

management. Sub-funds were identified by an automatic procedure that involved comparing the names of funds within the same investment strategy and the names of their management firms (investment advisors), as well as checking the correlation between their historical returns.

It is also important to note that it was assumed that liquidations took place immediately after the last reported returns, since there is no way of accounting for a possible liquidation bias, i.e. the fact that hedge fund managers can stop reporting to a database before the final liquidation value of a fund has been determined.[5] Hence, the forecast window within which a hedge fund's liquidation could occur was set to the next month.

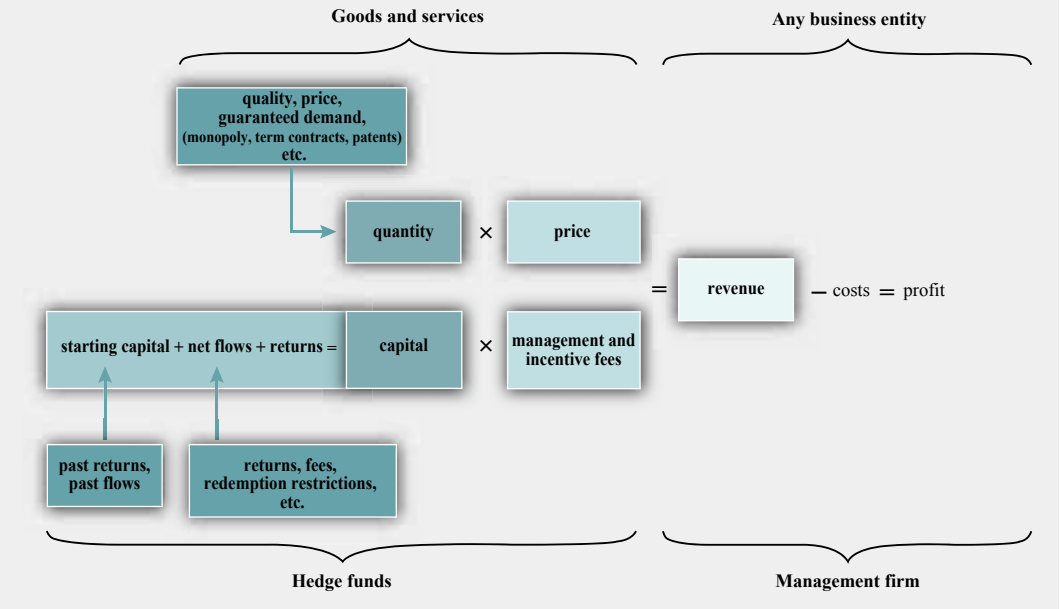
## EXPLANATORY VARIABLES

Before proposing a list of variables that might be good predictors of cases of hedge fund liquidation, it is useful to compare hedge funds with other business entities. Such a comparison is depicted in Chart D.3 and highlights how various aspects of hedge funds' activities are interconnected. This framework is particularly helpful for the selection of variables that may be good predictors of hedge fund liquidations due to business difficulties associated with an insufficient or declining capital base or poor investment returns.

From the asset management business point of view, the size of capital under management is equivalent to the sales volume, but there are also other reasons why it is such an important factor in hedge fund liquidation risk. For example, some investors have allocation limits, either absolute (minimum investment amount) or relative (as a maximum proportion of the hedge fund's total capital). Furthermore, a large volume of capital under management serves investors as a proxy for the quality of operational risk controls and the overall maturity of the hedge fund's management firm.

5 See Box 6 in ECB, *Financial Stability Review*, June 2007.

Chart D.3 A hedge fund as a business entity




The variables that might help to predict cases of hedge fund liquidation can be grouped into several sets that refer to specific aspects of hedge fund activities. These sets, as well as descriptions of the individual explanatory variables, are provided in Table D.1.

The first set of variables refers to investment performance, with a further split into historical and recent returns. This differentiation is due to the fact that investment and divestment decisions may be driven by different evaluation horizons.[6] A costly and time-consuming managerial due-diligence process may lead to lower responsiveness on the part of prospective investors to recent performance since more weight is likely to be attached to the historical track record. By contrast, active monitoring by existing investors may result in a higher sensitivity to weak recent returns. In addition, three subsets of return indicators were used: absolute returns, the performance relative to peers following the same investment strategy and the fund's strategy index performance relative to the return index of the hedge fund sector as a whole.

The second set of indicators aims to capture the risk profile of a hedge fund. It includes second and higher moments of hedge fund returns, information on the use of leverage and derivatives, as well as dummy variables for various investment strategies. In the list, there is also a volatility measure that was adjusted with the Cornish-Fisher expansion at a 99% confidence level. Moreover, in order to gauge the possible illiquidity of hedge fund investments or intentional return smoothing by a hedge fund manager, a first-order autocorrelation coefficient was used.[7]

The third set includes variables associated with the fee structure and incentives faced by a hedge fund manager. Quite often, incentive fees are accrued throughout the calendar year, but paid out only once, at the end of the year. The last

6 See G. Baquero and M. Verbeek, "A portrait of hedge fund investors: Flows, performance and smart money", *ERIM Report Series Research in Management*, August 2005.

7 See C. Asness, R. Krail and J. Liew, "Do Hedge Funds Hedge?", *The Journal of Portfolio Management*, Fall 2001, and M. Getmansky, A. W. Lo and I. Makarov, "An Econometric Model of Serial Correlation and Illiquidity in Hedge Fund Returns", *Journal of Financial Economics*, Vol. 74, 2004.

variable in this set captures the dynamics of this entitlement during a calendar year.[8]

Redemption restrictions comprise the fourth set of variables. All listed withdrawal constraints except the payout period serve as defenders of the hedge fund's capital base, which is equivalent to the sales volume from a business perspective (see Chart D.3).

Variables in the fifth group represent an attempt to check the impact of the competitive environment on liquidation risk by testing the importance of the level of, and changes in, the market share of the broad investment strategy which the hedge fund pursues. An increasing market share could be a sign of the strategy's attractiveness to investors. At the same time, such popularity might pull in new hedge fund managers and thereby intensify competition for profitable investment opportunities.[9]

The purpose of the sixth group is to account for a possible clustering of cases of hedge fund liquidation within the same investment strategy or spillover effects from other strategies. Such interdependence might arise from similar investment positions (crowded trades) or correlated shocks to the liability side of hedge funds' balance sheets stemming from prime brokers' actions or investors' redemptions.

The last set of variables is dedicated to various business-related issues. It includes a fund's age, capital under management, estimates of the US dollar amounts of management and incentive fee income, and monthly dummy variables. It is important to note that during the estimation sample period, the average size of a hedge fund increased, as did the general price level and the minimum size of a commercially viable hedge fund. To account for these factors, every monthly observation of capital under management and estimated US dollar fee income was divided by the median size of all hedge funds included in the estimation sample in that particular month.

## ESTIMATION RESULTS

Given the set of explanatory variables, a panel logit model was estimated using a random effects specification with 63,554 observations.[10] The columns in the middle of Table D.1 report the estimation results for the baseline and for the final model specifications respectively. At the bottom of the table, the McFadden pseudo-$R^2$ and the Akaike and Bayesian information criteria provide information on the goodness of fit.

The baseline specification included all proposed explanatory variables, whereas the final specification was produced with the aim of finding a list of variables that would all be statistically significant. It was derived in the following way. In a first step, the dependent variable was regressed on a constant and all explanatory variables, thereby yielding the baseline model. In a second step, all explanatory variables with p-values above 0.4 were dropped, as were also all strategy and monthly dummy variables with p-values above 0.1. Then the model was re-estimated with the remaining list of variables, which were dropped one by one on the basis of the highest p-values until there were no more variables with p-values above 0.1. At this stage, variables with economically counterintuitive signs were removed and the one-by-one dropping procedure was run again to provide a final list of variables.

It should be noted, however, that – unlike what occurred in the baseline specification – the variable for the standard deviation of returns (volatility) was highly statistically significant (p-value close to zero) in all intermediate specifications until it

8 The fact that the amount of incentive fees is determined in January also explains the significance of November and December dummy variables. See also V. Agarwal, N. Daniel and N. Naik, "Why is Santa so kind to hedge funds? The December return puzzle!", March 2007, available at SSRN.

9 See also M. Getmansky, "The Life Cycle of Hedge Funds: Fund Flows, Size and Performance", *Working Paper*, Isenberg School of Management, University of Massachusetts, January 2005.

10 The specification was chosen on the basis of a Hausman test.

## Table D.1 Explanatory variables and estimation results

| | Baseline model | | Final model | | |
|---|---|---|---|---|---|
| | coefficient | p-value | coefficient | p-value | |
| **Investment performance results** | | | | | |
| *Historical returns* | | | | | |
| Historical return | -0.075 | 0.68 | | | Compound monthly rate of return in the fund's reporting currency during the last 18 months. |
| Relative historical return | 0.145 | 0.42 | | | **Historical return** in US dollars minus the equivalent return of the respective Credit Suisse/ Tremont strategy index over the same period. |
| Relative historical strategy return | 0.400 | 0.03** | | | Compound monthly rate of return in US dollars of the respective Credit Suisse/Tremont strategy index during the last 18 months minus the equivalent return of the Credit Suisse/Tremont Broad Hedge Fund Index. |
| Relative 12-month return | -0.003 | 0.73 | | | 12-month return in US dollars minus 12-month return of the respective Credit Suisse/Tremont strategy index. |
| *Latest returns* | | | | | |
| R | -0.002 | 0.86 | | | Current and lagged monthly net-of-fee returns in fund's reporting currency. |
| R(-1) | -0.013 | 0.40 | | | |
| R(-2) | 0.025 | 0.12 | | | |
| R 6-month return | 0.030 | 0.07* | | | Latest 6-month **R**. |
| R current drawdown | -0.029 | 0.09* | | | Current **R** drawdown based on the last 18 months. |
| Relative 6-month return | -0.046 | 0.01*** | -0.022 | 0.00*** | **R 6-month return** in US dollars minus 6-month return of the respective Credit Suisse/Tremont strategy index. |
| Relative strategy return | 0.027 | 0.44 | | | Current, lagged and 6-month returns in US dollars of the respective Credit Suisse/Tremont strategy index minus the equivalent return of the Credit Suisse/Tremont Broad Hedge Fund Index. |
| Relative strategy return (-1) | 0.058 | 0.09* | | | |
| Relative strategy return (-2) | 0.033 | 0.37 | | | |
| Relative 6-month strategy return | -0.050 | 0.02** | | | |
| **Risk profile** | | | | | |
| Historical volatility | -0.143 | 0.09* | | | Standard deviation of **R** during the last 18 months. |
| Historical skewness | -0.061 | 0.51 | | | Skewness of **R** during the last 18 months. |
| Historical kurtosis | 0.045 | 0.20 | | | Kurtosis of **R** during the last 18 months. |
| Historical Cornish-Fisher volatility | -0.007 | 0.78 | | | **Historical volatility** adjusted with the Cornish-Fisher expansion at a 99% confidence level (z = -2.33; if both skewness and kurtosis are zero, the adjustment will yield negative **historical volatility**). |
| Leverage | 0.013 | 0.94 | | | Dummy variable, 1 if the fund uses leverage and zero otherwise. |
| Derivatives | 0.342 | 0.02** | 0.323 | 0.02** | Dummy variable, 1 if the fund uses derivatives and zero otherwise. |
| Autocorrelation of returns | 0.093 | 0.74 | | | First-order autocorrelation coefficient of **R** during the last 18 months. |
| Strategy [1,9] | [–0.13, 0.89] | [0.35, 0.93] | | | Dummy variables, 1 if coincides with the fund's investment strategy and zero otherwise. No dummy variable for the dedicated short bias strategy. |
| **Fees and incentives** | | | | | |
| Personal capital | 0.102 | 0.43 | | | Dummy variable, 1 if the manager co-invested own money and zero otherwise. |
| High watermark | -0.452 | 0.00 *** | -0.479 | 0.00 *** | Dummy variable, 1 if a high-watermark provision applies and zero otherwise. |

**Table D.1 Explanatory variables and estimation results (continued)**

| | Baseline model | | Final model | | |
|---|---|---|---|---|---|
| | coefficient | p-value | coefficient | p-value | |
| Management fee | -0.145 | 0.19 | -0.220 | 0.01** | Annual management fee as a proportion of average CUM. |
| Incentive fee | 0.020 | 0.06* | 0.017 | 0.08* | Annual performance fee as a proportion of returns above a high watermark and a hurdle rate, if any. |
| Non-negative YTD HWM incentive fee | -0.004 | 0.00*** | -0.003 | 0.00*** | Either zero or positive year-to-date return above a high watermark, if any, that was valid at the end of December the previous year multiplied by the **incentive fee**. |
| **Redemption restrictions** | | | | | |
| Lockup period | -0.020 | 0.15 | | | Minimum investment holding period in months. |
| Redemption frequency | 0.029 | 0.37 | | | In months. |
| Notice period | -0.421 | 0.00*** | -0.366 | 0.00*** | In months. |
| Payout period | -0.201 | 0.15 | -0.239 | 0.08* | In months. |
| **Competitive environment** | | | | | |
| Strategy share | -2.400 | 0.14 | | | Total CUM in US dollars of all funds belonging to the same broad strategy group as the fund in question as a proportion of total CUM in US dollars of all hedge funds in the sample. |
| 1-month change in strategy share | -3.025 | 0.63 | | | 1, 3, 6 and 12-month changes in **strategy share**. |
| 3-month change in strategy share | -1.833 | 0.78 | | | |
| 6-month change in strategy share | 0.769 | 0.90 | | | |
| 12-month change in strategy share | -7.058 | 0.08* | | | |
| **Correlation of liquidations** | | | | | |
| Liquidations within strategy | 7.980 | 0.13 | 9.234 | 0.05** | Current and lagged ratios of liquidated funds within the fund's strategy to all funds within the fund's strategy at the end of the previous month. |
| Liquidations within strategy (-1) | -4.272 | 0.56 | | | |
| Liquidations within strategy (-2) | 5.933 | 0.29 | | | |
| Liquidations in all other strategies | 2.703 | 0.90 | | | Current and lagged ratios of liquidated funds outside the fund's strategy to all funds outside the fund's strategy at the end of the previous month. |
| Liquidations in all other strategies (-1) | 38.305 | 0.04** | | | |
| Liquidations in all other strategies (-2) | 14.645 | 0.43 | | | |
| **Business-related issues** | | | | | |
| Age | -0.012 | 0.01*** | -0.007 | 0.00*** | The current age of the fund in months. |
| Age$^2$ | 0.000 | 0.25 | | | The squared **age**. |
| Capital | -0.325 | 0.00*** | -0.223 | 0.00*** | CUM in US dollars divided by the median CUM in that month. |
| 1-month change in capital | 0.050 | 0.61 | | | 1, 3, 6 and 12-month change in CUM in US dollars divided by the median CUM in that month. |
| 3-month change in capital | -0.030 | 0.86 | | | |
| 6-month change in capital | -0.048 | 0.41 | | | |
| 12-month change in capital | 0.013 | 0.81 | | | |
| 1-month percentage change in capital | -0.006 | 0.25 | | | 1, 3, 6 and 12-month percentage change in CUM in the fund's reporting currency. |
| 3-month percentage change in capital | -0.009 | 0.03** | -0.011 | 0.00*** | |
| 6-month percentage change in capital | 0.001 | 0.00*** | | | |
| 12-month percentage change in capital | -0.008 | 0.00*** | -0.008 | 0.00*** | |

**Table D.1 Explanatory variables and estimation results (continued)**

| | Baseline model | | Final model | | |
|---|---|---|---|---|---|
| | coefficient | p-value | coefficient | p-value | |
| Capital x non-negative YTD HWM incentive fee | 4.433 | 0.10* | | | CUM in US dollars at the end of December the previous year multiplied by **non-negative YTD HWM incentive fee** and divided by the median CUM in that month. |
| Capital x management fee | 4.627 | 0.72 | | | Manager's **management fee** income over the last 3 months divided by the median CUM in that month. |
| Quarterly change in capital x management fee | 65.396 | 0.13 | | | Difference between manager's **management fee** income over the last 3 months and the same income a quarter ago divided by the median CUM in that month. |
| Months Jan.-Oct., excluding Mar. | [–0.29, 0.46] | [0.13, 0.91] | | | Dummy variable for each month from January to October, except March. |
| November | 0.603 | 0.04** | 0.490 | 0.01*** | Dummy variable, 1 if the current month is November and zero otherwise. |
| December | 0.812 | 0.01*** | 0.686 | 0.00*** | Dummy variable, 1 if the current month is December and zero otherwise. |
| Constant | -4.190 | 0.00*** | -3.819 | 0.00*** | |
| McFadden pseudo-$R^2$ | 15.96 | | 13.34 | | |
| Akaike information criterion | 3,299 | | 3,275 | | |
| Bayesian information criterion | 4,006 | | 3,429 | | |

Notes: CUM stands for capital under management. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels respectively.

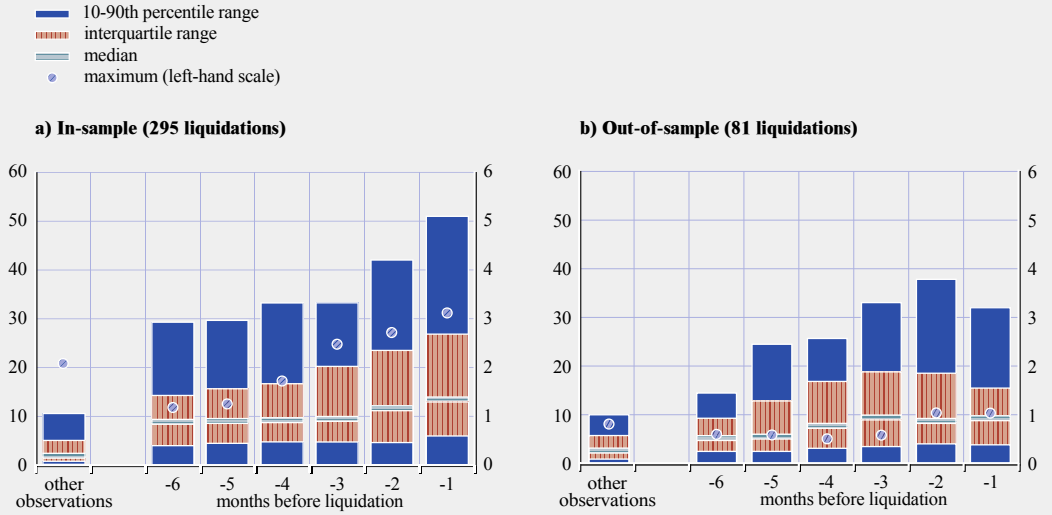
was dropped together with some other variables owing to a counterintuitive sign, suggesting that higher return volatility means lower liquidation risk. The Madoff fraud case, in which smooth and consistent returns should have raised a red flag, immediately comes to mind, but it is nevertheless quite likely that a self-selection bias might play a role here too. One could speculate that when a hedge fund with an attractive and smooth investment record self-selects to report to a database, it has not yet experienced a serious market shock and therefore remains vulnerable to a "black swan", "time bomb" or "left tail" event. The same could be said about hedge funds that pursue primitive "leveraged carry", out-of-the-money option-selling and other low-volatility but potentially devastating investment strategies, which have also often been likened to the collection of nickels in front of a steamroller.

The resulting final specification includes 15 variables and a constant. As expected, variables based on capital under management clearly dominate and there is at least one variable from each set of indicators except for the competitive environment group. Three and twelve-month percentage changes in, as well as the minimum level of, capital under management regularly feature in banks' credit agreements with hedge funds as net asset value-based triggers (see also Chart 4.20 in Section 4.2), and these estimation results confirm their importance. Even though there is one variable relating to relative returns in the final specification, the lack of absolute return variables could be explained by the fact that changes in the capital under management combine the impact of both net flows and returns, and thus seem to outperform pure return variables.

The presence of other variables in the final specification is more or less intuitive, although the November dummy has not been commonly found significant in similar studies. Moreover, the reasons for the importance of the payout period variable are not straightforward. One explanation could be that the longer the time after redemption that redeeming investors receive their money, the more they are discouraged from submitting withdrawal requests as a result of short-term factors. As regards the correlation

**Chart D.4 Estimated probability of hedge fund liquidation before liquidation based on the estimation sample data**

(in-sample period: Jan. 1994 – Dec. 2007; out-of-sample period: Jan. 2008 – Feb. 2009; percentage probability of liquidation)




Sources: Lipper TASS database and ECB calculations.
Note: In the out-of-sample analysis, the last six monthly observations before cases of non-liquidation attrition or last reported returns were excluded from computations. In the latter case, the destiny of a hedge fund after its last reported returns was not known, and therefore its last six monthly observations were excluded in order to ensure comparability.

between cases of hedge fund liquidation, it seems that contagion-like effects are present only among hedge funds belonging to the same broad investment strategy group.

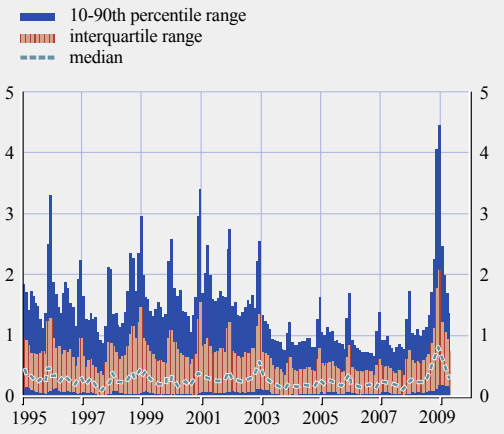
In addition to the statistical measures of the goodness of fit reported in Table D.1, Chart D.4 provides an illustration of model performance both within and outside the estimation window for the selected sample of hedge funds. In both cases, estimated probabilities of liquidation tended to increase as a liquidation event approached, and were also generally higher than probabilities estimated for the periods that were more than six months before a liquidation event (see the bars designated "other observations").

## COMPOSITE INDICATOR

In order to derive an aggregate indicator of liquidation risk in the hedge fund sector, the coefficients obtained in the final specification could be used to compute a probability of liquidation for every hedge fund in the database that has enough information for the minimum set of required variables. Since the final specification includes only 15 variables, the number of eligible hedge funds increases in comparison with the

**Chart D.5 Composite indicator of single-manager hedge fund liquidation risk**

(Jan. 1995 – Apr. 2009; distribution of percentage probability of liquidation)




Sources: Lipper TASS database and ECB calculations.
Notes: Based on 2,152 single-manager hedge fund investment records. The most recent data are subject to incomplete reporting.

number of hedge funds used in the estimation sample, which was obtained after a conservative filtering procedure that is necessary to estimate the baseline specification. The distribution of these individual probabilities for each point in time is shown in Chart D.5, which represents the proposed composite indicator of liquidation risk.

## CONCLUDING REMARKS

The proposed composite indicator of hedge fund liquidation risk confirms that the liquidation risk had increased markedly in the hedge fund sector by the end of 2008, and remained high thereafter. It is important to note, however, that the indicator reports the estimated risk of liquidation, which may not necessarily signify a collapse with the complete loss of investors' capital and large losses for creditor banks. Many hedge funds that close seem to do so for business reasons. Therefore, in order to better capture the risk of a hedge fund collapse, it would be desirable to have more variables related to the risk profile of a hedge fund, particularly as regards leverage, on which information is very scarce.

The current version of the indicator may undergo further modifications, as is common for such relatively complex indicators. Nevertheless, it will serve as a useful tool for monitoring developments in the hedge fund sector from a financial stability perspective.

## E SOME LESSONS FROM THE FINANCIAL MARKET TURMOIL FOR THE USE OF MARKET INDICATORS IN FINANCIAL STABILITY ANALYSIS

*This special feature discusses some of the market-based indicators that are used regularly in the Financial Stability Review (FSR), focusing in particular on indicators whose information content was distorted by the financial crisis owing to factors such as extreme risk aversion, impaired market liquidity and high uncertainty about the intrinsic values of assets traded on some markets. The analysis shows that, particularly during times of crisis, great analytical efforts are required for an appropriate interpretation of developments in these indicators. This is due to the fact that credit default swap (CDS) spreads, interest rates and equity prices all include a range of risk premia, so that it is important to be aware how much and in what ways these premia are driving asset prices. If these factors are properly taken into account, market-based indicators still provide a very rich source of up-to-date information for financial stability analysis.*

### INTRODUCTION

Indicators based on asset prices can provide important information for financial stability analysis for two main reasons. First, since such indicators are based on market prices or other types of asset valuations, they should reflect market participants' expectations about future developments in the fundamental factors that drive them. For instance, in principle, asset prices represent the discounted expected returns to investors from holding such assets. If markets are efficient, this means that asset prices should incorporate all currently available information that is relevant for their pricing. In other words, market-based indicators can provide forward-looking information which can be used in a comprehensive financial stability assessment to complement information from backward-looking indicators such as the information found in balance sheets. A second reason why market-based indicators are an important source of information relates to their availability at high frequency, with the vast majority of them being available daily. This can make them especially useful in situations where the financial stability outlook may be changing significantly within very short periods of time. Nevertheless, market-based indicators also have some shortcomings, which must be taken into account when forming financial stability assessments. In particular, during the recent financial crisis, such indicators have been affected, among other things, by extreme risk aversion, impaired market liquidity and additional risk premia on top of those, which predominate during normal times. Such elements can distort their information content.

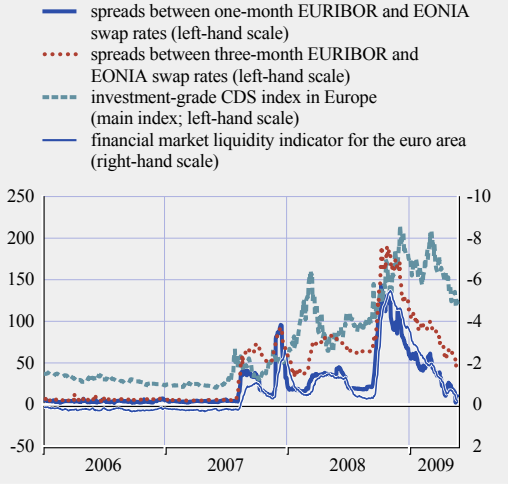
### IMPACT OF THE FINANCIAL MARKET STRESSES ON MARKET-BASED INDICATORS

#### CREDIT DEFAULT SWAP-BASED INDICATORS

One of the most distinctive features of the current financial crisis is that it has been associated with a chronic lack of liquidity in a number of financial markets (see Chart E.1). The drying-up of market liquidity was initially felt in the market for the most complex structured

**Chart E.1 Financial market liquidity indicator and money market spreads for the euro area and the CDS index in Europe**

(Jan. 2006 – May 2009)




Sources: ECB, Bank of England, Bloomberg, JP Morgan Chase & Co., Moody's KMV and ECB calculations.
Note: The financial market liquidity indicator is presented in inverted scale.

credit securities, namely collateralised debt obligations (CDOs). However, it quickly spread to the other parts of the market for asset-backed securities (ABSs). Finally, vanishing liquidity also affected the corporate debt market, as well as the usually very liquid interbank money market and the CDS market. Investors will normally demand higher returns from assets that are traded in illiquid markets and this liquidity premium is an important component of asset prices. In the early stages of the crisis, the drying-up of market liquidity was an important, if not the main, driver of some asset prices and it was reflected in the widening of spreads across a range of markets including the interbank money market and the CDS market (see Chart E.1).

An important indicator of aggregate credit risk that has been used extensively in this FSR and elsewhere is the CDS spread. This is because, in principle, CDS spreads should provide a pure measure of default risk, since they represent the price that investors who wish to protect themselves against the risk of the default of an underlying entity are prepared to pay sellers of credit protection. As such, CDS spreads should predominantly reflect market participants' assumptions about the probability of default of the underlying entity. In the most basic approach to the valuation of CDS spreads, they can be seen as a function of the probability of default (PD) and the recovery rate (RR):

$$CDS = PD \times (1-RR)$$

Even using this basic model for pricing CDSs, it is clear that the probability of default is not the only driving factor of the spread but that assumptions that are made about the recovery rate are also important in determining its level. In many pricing models, the recovery rate is assumed to be fixed, but some authors suggest that the probability of default and the loss given default (LGD = 1-RR) may be cyclically interdependent. For instance, Altman suggests that there is a negative correlation between default rate and recovery rate over the cycle.[1] The corollary of this is that the correlation between the losses given default and the probabilities of default should be positive. This means that it can usually be expected that before economic downturns CDS spreads will increase in anticipation of the downturn by more than the underlying probabilities of default. This is because the rise in probabilities of default will most likely be accompanied by rising losses given default, which will amplify the overall loss to the investor who is exposed to the underlying credit risk. If losses given default are changing over time, this makes it difficult to interpret movements in CDS spreads in a straightforward manner unless a view is also taken of the likely losses that will occur in the event of default. In this vein, one feature of the current turmoil has been growing expectations that LGD rates will be higher than in the recent past.

During the recent period of financial market strains, apart from a heightened liquidity risk premium and expectations of higher LGD rates, CDS spreads may also have been affected by other risk premia related to jump-to-default risk – i.e. the risk of a sudden default occurring before the market has had time to factor the increased default risk into current spreads – or systemic risk. In normal times, premia related to these risks tend to have a negligible impact on the level of CDS spreads, but the default of Lehman Brothers, which was a classic example of jump-to-default risk materialising, clearly illustrated the importance of this risk (see Chart E.2). On the other hand, systemic risk, i.e. the risk of simultaneous failure of a number of institutions, or of the entire financial system, as a result of interlinkages that exist in the system, may be particularly significant for the pricing of CDS on debt issued by banks or insurance companies, which tend to have much higher degrees of interconnectedness than is the case for non-financial sectors. These risk factors should be taken into account when drawing conclusions either from the levels of, or changes in, the CDS spreads of large and complex banking groups (LCBGs) and other financial institutions.

1 See E. I. Altman, "Credit Risk and the Link between Default and Recovery Rates", *CFA Institute publication*, No 1, December 2006.

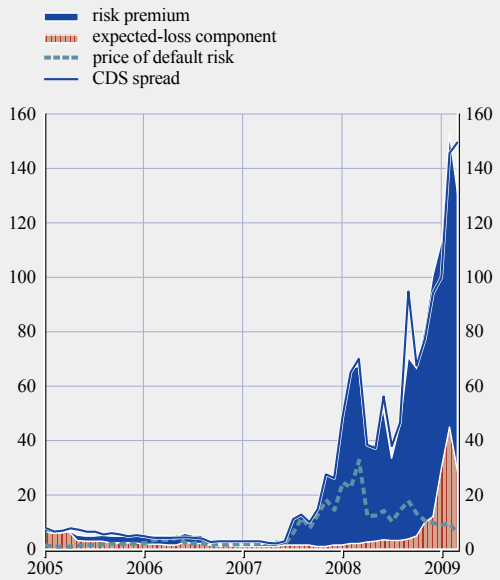
**Chart E.2 Materialisation of jump-to-default risk during the default of Lehman Brothers**

(CDS spread; basis points; senior debt; five-year maturity)


Source: Bloomberg.

**Chart E.3 Decomposition of the CDS spreads of euro area large and complex banking groups**

(Jan. 2005 – Mar. 2009; basis points)




Sources: Bloomberg, Moody's KMV and ECB calculations.
Notes: Since expected-loss components and risk premia were calculated for each LCBG individually, their medians do not necessarily sum 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.

To illustrate the impact of jump-to-default risk and systematic risk premia, an indicator of the price of default risk was calculated, as demonstrated by Amato.[2] According to intensity-based CDS pricing models, the CDS premium can be decomposed into an expected-loss component and a default risk premium. The latter is composed of a jump-to-default risk premium and a systematic risk premium, which compensates for the volatility of risk factors that affect the default probability. Thus, the default risk premium can be measured as the difference between the CDS spread and the expected-loss component. Alternatively, the decomposition can also be done using a product of risk premium components, whereby the risk adjustment ratio compensates for a unit of expected loss and is usually reflected as the price of default risk. Using this approach, both the price of default risk and the risk adjustment ratio may be approximated by the quotient of the CDS premium to the expected loss component. This ratio is a measure of investors' aversion to default risk.

The significant widening observed after August 2007 in the CDS spreads of euro area LCBGs was driven mainly by the default risk premium (see Chart E.3). Between 2005 and mid-2007, by contrast, the largest proportion of CDS spreads was explained by patterns in the compensation demanded by investors for expected losses.

After the eruption of the market turmoil, the expected-loss component increased only moderately in comparison with the default risk premium. From April 2008 onwards, aversion to credit risk, as measured by the price of default risk, fell. In particular, it declined from the beginning of 2009, even though CDS spreads increased at that time. The rise in the CDS spreads was due to an increase in the expected loss component, which rose steadily after the end of 2007, and surged in the fourth quarter of 2008. This suggests that CDS spreads were

2 See J. D. Amato, "Risk aversion and risk premia in the CDS market", *BIS Quarterly Review*, Bank for International Settlements, December 2005.

increasingly driven by rising probabilities of default of individual LCBGs.

A simple VAR (vector autoregression) model-based decomposition of the variance of the total risk premium in CDS spreads revealed that as much as 46% of the variance may be explained by systemic risk, as measured by a systemic risk indicator, and another 25% by liquidity, as measured by a market liquidity risk indicator (see also Chart E.3). This suggests that the high levels of aversion among investors regarding LCBGs' credit risk were driven mainly by fears related to jump-to-default risk – owing to the possibility of a systemic spill-over – and, to a lesser extent, by vanishing liquidity in the broader financial markets.

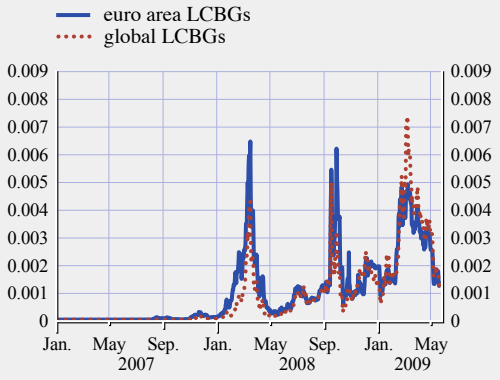
It is important to note that one of the systemic risk indicators regularly used in this FSR may have been affected by changes in all default risk premia, since CDS spreads are the most important input into the model (see Chart E.4).[3]

Apart from the risk premia discussed above, there is a further reason for interpreting patterns in this indicator with caution. In particular, the increase in the indicator up to mid-March 2009 may have been related to increasing concerns among market participants that the only possible solution to the problems faced by some banks was to nationalise them, most likely temporarily. In ISDA Master Agreements, under which most CDS trades are executed, nationalisation is considered to be a credit event, triggering the payoffs to protection buyers that they would have received had the institution defaulted.[4] This risk can be clearly distinguished from default risk and should be seen as an additional risk premium in the CDS spreads of banks. The existence of this risk makes the interpretation of patterns in the CDS-based indicator of systemic risk difficult because market participants would have viewed the nationalisation of a LCBG as a step designed to avoid possible systemic consequences, thereby decreasing systemic risk in the banking system, contrary to what the indicator suggested on the surface.

Another example of how dislocations in financial markets may have affected the pricing of assets is to be found in the recent developments in the "bond-CDS basis", i.e. the difference between the CDS spread and the spread implied from the bond price on the same underlying company. In principle, both CDS spreads and bond spreads should represent the price of the same underlying credit risk. Thus, any difference between the two spreads should be transitory, i.e. should disappear in the long run. In particular, if a negative basis emerges, an investor can profit by buying a bond (long position in credit risk) and, at the same time, purchasing protection on the same underlying name in the CDS market (short position in credit risk). Such an arbitrage opportunity could be exploited by the investors without any risk, so that it should force the two

**Chart E.4 Joint probability of distress for euro area and global large and complex banking groups**

(Jan. 2007 – May 2009)




Sources: Bloomberg and ECB calculations.
Note: The samples of euro area and global LCBGs include 14 and 12 banks respectively. The difference between the two series in terms of scale is related to the sample size, i.e. more banks in the sample lower the probability of joint default.

3 See Section 4.3 for more details on the systemic risk indicator depicted in Chart E.4.

4 The ISDA (International Swaps and Derivatives Association) was chartered in 1985, and today has over 830 member institutions from 57 countries on six continents. These members include most of the world's major institutions that deal in privately negotiated derivatives, as well as many of the businesses, governmental entities and other end users that rely on over-the-counter derivatives to manage efficiently the financial market risks inherent in their core economic activities.

spreads to converge. However, in the months following the default of Lehman Brothers, corporate bond market liquidity all but dried up. This added significant additional liquidity risk premia to the spreads of corporate bonds, while the CDS market remained relatively liquid at that time. As a consequence, the bond-CDS basis entered negative territory, with the average difference between the spreads implied from bonds and CDSs amounting to as much as 100 basis points for the European investment-grade companies and even 300 basis points for US investment-grade companies. The wide bond-CDS basis proved to be persistent on account of a lack of funding, overall pressure towards deleveraging and marking-to-market risk embedded in basis trades.[5]

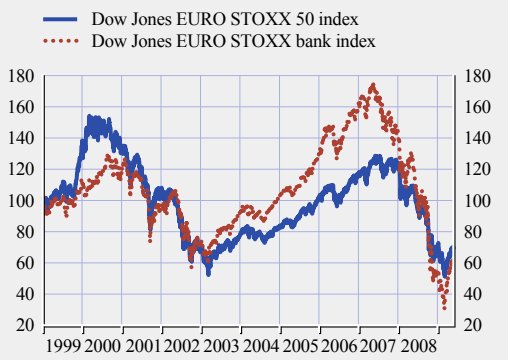
Spreads implied from bonds of LCBGs, rather than from CDS spreads, may be used to calculate, for instance, a similar systemic risk indicator, as illustrated in Chart E.4. Since bond-implied spreads have remained higher than CDS spreads, such a bond-based systemic risk indicator would suggest a much higher probability of systemic risk than that calculated using CDS spreads. However, the level of systemic risk indicated by this indicator would be an obvious overestimation and would not represent the actual level of systemic risk to which the financial system is exposed.

## EQUITY PRICE-BASED INDICATORS

Indicators based on equity prices, in particular share prices of banks and insurance companies, are also frequently used in this FSR and elsewhere. These are analysed to assess banks' earnings capacities, capital positions and loss absorption capacities, as perceived by market participants. Although the equity prices of LCBGs have been in constant decline since the start of the crisis (see Chart E.5), the reasons for declining shareholder value have varied over time. In the early stages of the crisis, potential losses on sub-prime exposures and uncertainty surrounding the magnitude of these losses were the major drivers of falls in banks' stocks equity in mid-2007.

**Chart E.5 Dow Jones EURO STOXX total market and bank indices**

(Jan. 1999 – May 2009; index: Jan. 1999 = 100)




Source: Bloomberg.

Following the collapse of the originate-to-distribute model and the spread of losses beyond CDO markets in autumn 2007, there were fears about the ability of banks to withstand funding constraints and possible further marking-to-market losses on non-sub-prime securities. In 2008 fears that some banks might not withstand further losses and that the worsening economic situation might have adverse feedback effects on the real side of the economy were further aggravated by the possibility of systemic collapses of a few financial institutions. These fears temporarily decreased after the bailout of Bear Stearns, which fuelled expectations that none of the systemically important institutions would be allowed to fail by the authorities. However, these fears rematerialised in the aftermath of the default of Lehman Brothers. This was followed by further losses on structured credit securities, problems with the recapitalisation of some banks using private equity capital and a significant deterioration in the economic outlook, which increased the probability of feedback effects hitting banks' banking books. In the most recent episode of falls in banks' equity prices, investors became increasingly fearful of having their claims on the dividend cashflows of banks diluted as result of the possibility of injections of capital by governments into a more senior part of

5 See Box 9, entitled "The Bond-CDS basis and the functioning of the corporate bond market", in this issue of the FSR.

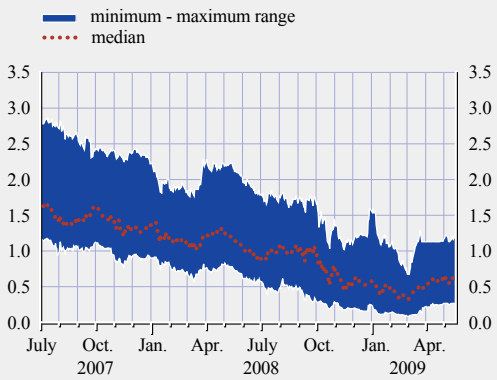
the capital structure such as through the creation of preferred shares.

The importance of this factor in driving bank equity price movements can be seen by examining patterns in the price-to-book value ratio (see Chart E.6).

This ratio is a valuation metric that can be seen as a floor for stock prices in a worst-case scenario. For instance, when a bank is liquidated, the book value is what may be left over for the owners after all the debts have been paid. A high price-to-book value ratio (in excess of unity) is often seen as an indication that an investor can expect to retrieve his investment in full, assuming that the assets on the balance sheet of the bank can be resold at their book value. During the recent market turmoil, government capital support increased the book value of equity, i.e. the denominator, but equity prices, i.e. the numerator, simultaneously fell as a result of the dilution effect. Overall, this indicator decreased significantly, even though the prospects of institutions receiving the capital injections should have improved. On the face of it, the drop in equity prices might have been interpreted as a bad signal. This illustrates the importance of complementing information extracted from asset prices with information on the underlying fundamentals.

**Chart E.6 Dispersion of price-to-book value ratios for euro area large and complex banking groups**

(July 2007 – May 2009)




Sources: Bloomberg and ECB calculations.

## CONCLUDING REMARKS

All in all, market-based indicators have proved to be useful in financial stability analysis. However, particularly during times of crisis, great analytical efforts are required to ensure that developments in these indicators are appropriately interpreted. This is due to the fact that asset prices such as CDS spreads, interest rates and equity prices all incorporate a range of risk premia, so that it is important to be aware of how much and in what ways these premia, are driving asset prices. This holds particularly true because the importance of these premia can change over time, sometimes abruptly and significantly during episodes of market stress. That said, taking these factors properly into account and applying a careful analysis of the drivers of the movements of the indicators, market-based indicators should still provide a rich source of up-to-date information for financial stability analysis.

# 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 that 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.

**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 S&P 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.

**Watermark:** A provision stipulating that performance fees are paid only if cumulative performance recovers any past shortfalls.

**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



## 1 EXTERNAL ENVIRONMENT



## 2 INTERNATIONAL FINANCIAL MARKETS

## 3 EURO AREA ENVIRONMENT



## 4 EURO AREA FINANCIAL MARKETS

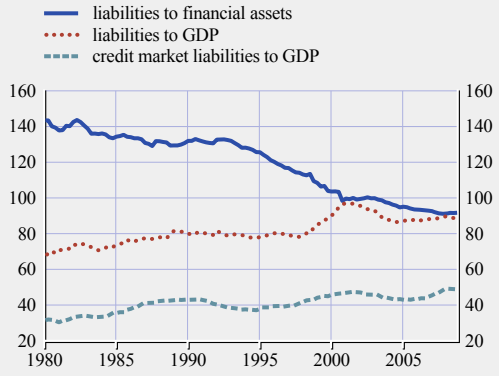
## 5 EURO AREA FINANCIAL INSTITUTIONS

## 6 EURO AREA FINANCIAL SYSTEM INFRASTRUCTURES

# I EXTERNAL ENVIRONMENT

## Chart S1 US non-farm, non-financial corporate sector business liabilities

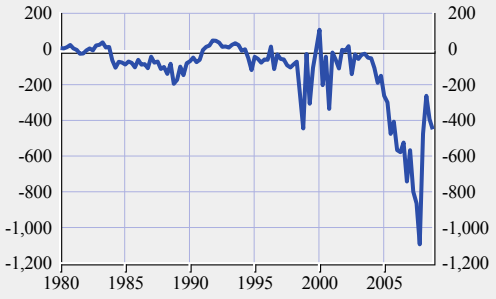
(Q1 1980 – Q4 2008; percentage)




Sources: US Federal Reserve Board and Bureau of Economic Analysis.

## Chart S2 US non-farm, non-financial corporate sector business net equity issuance

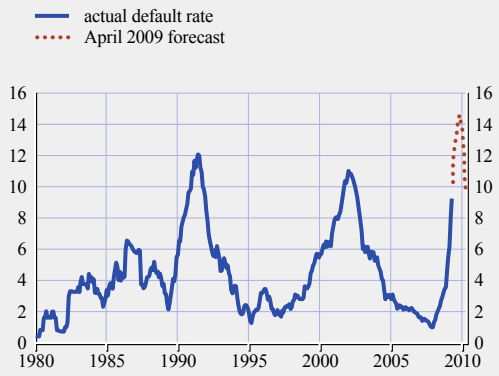
(Q1 1980 – Q4 2008; USD billions; seasonally adjusted quarterly annualised data)




Source: US Federal Reserve Board.

## Chart S3 US speculative-grade-rated corporations' default rates and forecast

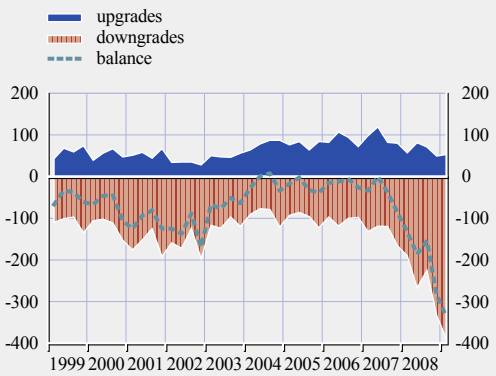
(Jan. 1980 – Apr. 2010; percentage; 12-month trailing sum)




Source: Moody's.

## Chart S4 US corporate sector rating changes

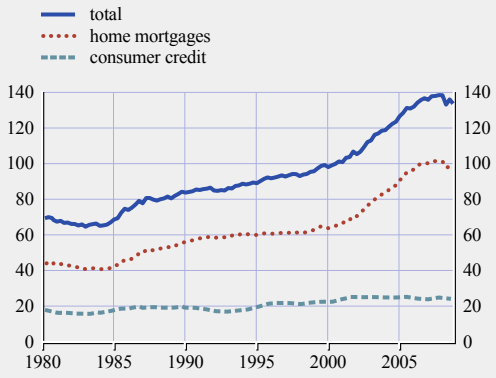
(Q1 1999 – Q1 2009; number)




Source: Moody's.

## Chart S5 US household sector debt-to-disposable income ratio

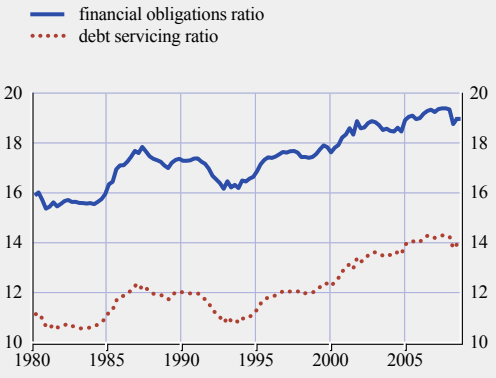
(Q1 1980 – Q4 2008; percentage of disposable income)




Source: US Federal Reserve Board.

## Chart S6 US household sector debt burden

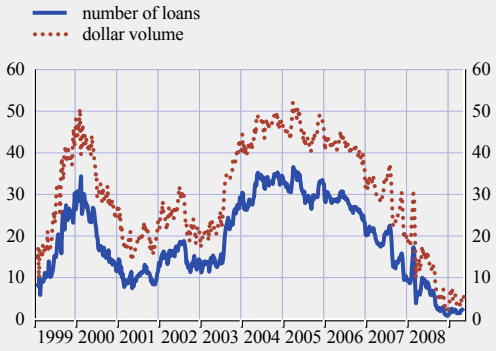
(Q1 1980 – Q4 2008; percentage of disposable income)




Source: US Federal Reserve Board.

## Chart S7 Share of adjustable-rate mortgages in the United States

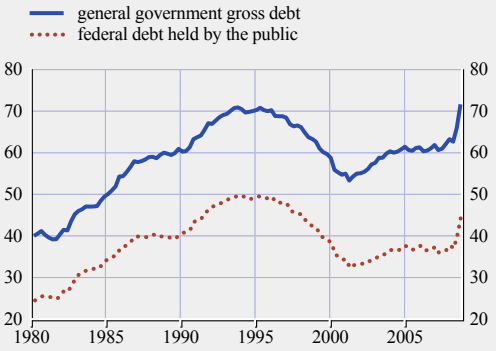
(Jan. 1999 – May 2009; percentage of total new mortgages)




Source: Mortgage Bankers Association.

## Chart S8 US general government and federal debt-to-GDP ratio

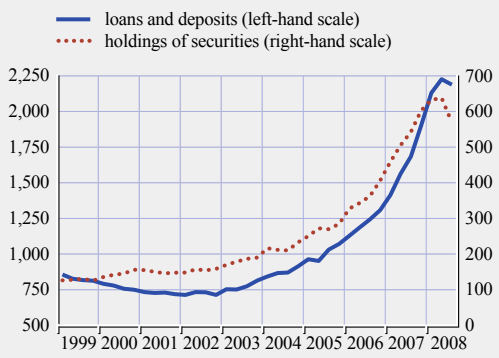
(Q1 1980 – Q4 2008; percentage of GDP)




Sources: US Federal Reserve Board and Bureau of Economic Analysis.
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 – Q3 2008; USD billions)




Source: Bank for International Settlements (BIS).

## Table S1 Financial vulnerability indicators for selected emerging market economies

| | Current account balance (% of GDP) | | | External debt (% of GDP) | | | Short-term external debt (% of reserves) | | | Foreign reserves (in months of imports) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2008 | 2009 (f) | 2010 (f) | 2008 | 2009 (f) | 2010 (f) | 2008 | 2009 (f) | 2010 (f) | 2008 | 2009 (f) | 2010 (f) |
| **Latin America** | | | | | | | | | | | | |
| Argentina | 2.3 | 1.7 | 2.2 | 47.8 | 53.3 | 60.6 | 47 | 50 | 48 | 6.7 | 6.6 | 6.6 |
| Brazil | -1.8 | -1.6 | -1.0 | 19.7 | 24.1 | 23.3 | 22 | 17 | 17 | 8.5 | 9.3 | 9.7 |
| Chile | -3.3 | -5.0 | -3.5 | 35.6 | 42.6 | 42.5 | 72 | 85 | 85 | 2.7 | 3.0 | 3.0 |
| Colombia | -2.1 | -3.2 | -2.9 | 19.7 | 26.5 | 27.0 | 27 | 27 | 27 | 5.0 | 4.6 | 4.6 |
| Mexico | -1.7 | -2.6 | -1.8 | 20.9 | 25.4 | 22.9 | 41 | 44 | 43 | 2.9 | 2.8 | 2.9 |
| Venezuela | 14.7 | 2.7 | 6.8 | 16.3 | 14.8 | 11.6 | 32 | 35 | 32 | 5.4 | 5.3 | 5.5 |
| **Asia** | | | | | | | | | | | | |
| China | 9.2 | 9.2 | 8.6 | 9.4 | 8.1 | 7.1 | 12 | 10 | 8 | 18.3 | 26.4 | 27.3 |
| India | -3.0 | -1.4 | -1.8 | 18.1 | 18.1 | 16.8 | 7 | 5 | 6 | 7.9 | 9.0 | 8.4 |
| Indonesia | 0.1 | -0.3 | -0.3 | 28.2 | 28.4 | 22.6 | 51 | 45 | 45 | 3.6 | 4.5 | 4.2 |
| Thailand | -0.1 | 4.4 | 2.9 | 23.8 | 23.3 | 21.3 | 22 | 20 | 19 | 5.9 | 7.9 | 7.6 |
| **Emerging Europe** | | | | | | | | | | | | |
| Russia | 3.9 | -5.0 | - | 27.2 | 33.5 | 33.4 | 29 | 34 | 51 | 9.7 | 5.7 | 4.3 |
| Turkey | -5.7 | -1.0 | -1.9 | 38.6 | 45.9 | 45.0 | 75 | 76 | 67 | 3.8 | 4.7 | 4.9 |

Source: Institute of International Finance.
Note: Data for 2009 and 2010 are forecasts. Data for 2008 are forecasts for Chile and Russia.

## Table S2 Value-at-risk (VaR) amounts by category of risk for global large and complex banking groups

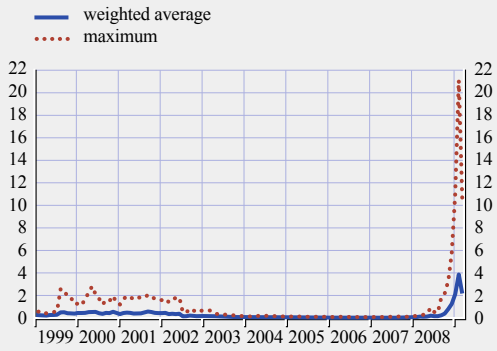
(USD millions; 99% confidence; ten-day holding period)

| | Commodities | | Equities | | Interest rate | | Foreign exchange | |
|---|---|---|---|---|---|---|---|---|
| | Average | Median | Average | Median | Average | Median | Average | Median |
| 2006 | 56.5 | 39.2 | 103.4 | 121.1 | 166.9 | 150.5 | 46.3 | 48.1 |
| 2007 | 65.0 | 57.0 | 141.0 | 144.7 | 252.5 | 269.1 | 58.0 | 72.7 |
| 2008 | 84.9 | 89.2 | 120.2 | 102.3 | 288.5 | 239.4 | 51.5 | 37.3 |

Sources: Securities and Exchange Commission (SEC) and institutions' quarterly reports.

## Chart S10 Expected default frequencies (EDFs) for global large and complex banking groups

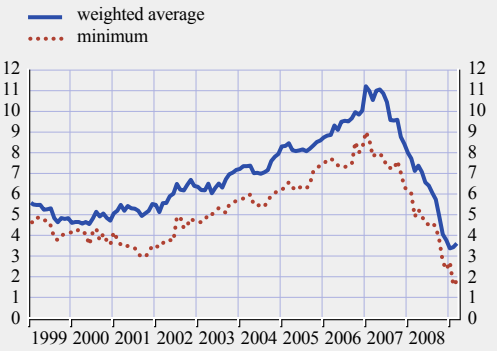
(Jan. 1999 – Mar. 2009; percentage probability)




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 – Mar. 2009)




Sources: Moody's KMV and ECB calculations.
Note: An increase in the distance-to-default reflects an improving assessment.

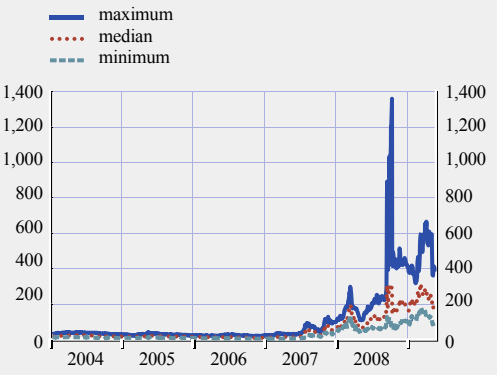
## Chart S12 Equity prices for global large and complex banking groups

(Jan. 2004 – May 2009; index: Jan. 2004 = 100)


Sources: Bloomberg and ECB calculations.

## Chart S13 Credit default swap spreads for global large and complex banking groups

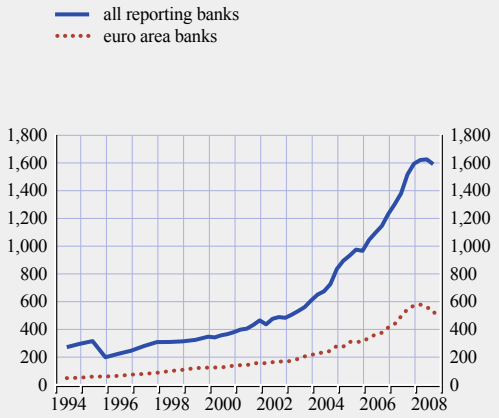
(Jan. 2004 – May 2009 basis points senior debt five-year maturity)




Sources: Bloomberg and ECB calculations.

## Chart S14 Global consolidated claims on non-banks in offshore financial centres

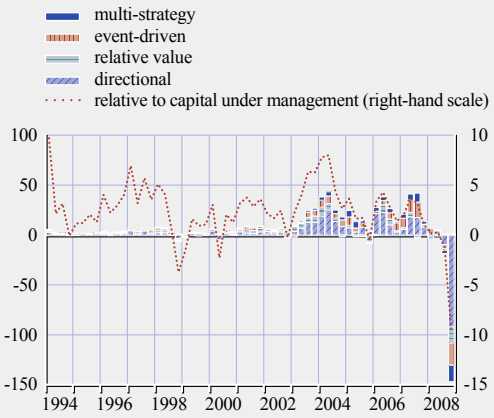
(Q1 1994 – Q3 2008; USD billions)




Source: BIS.

## Chart S15 Global hedge fund net flows

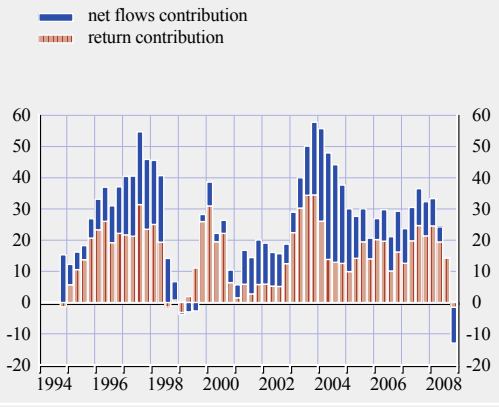
(Q1 1994 – Q4 2008; USD billions)




Sources: Lipper TASS and ECB calculations.
Note: 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

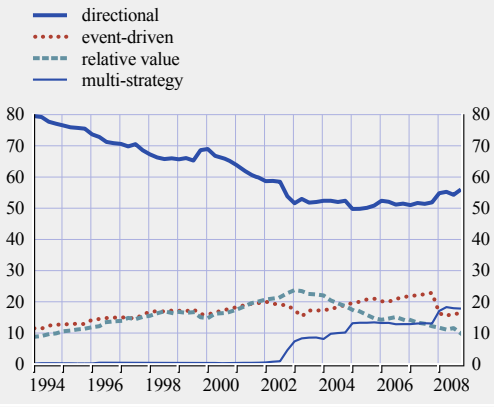
(Q4 1994 – Q4 2008; percentage; 12-month changes)




Sources: Lipper TASS and ECB calculations.
Note: 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 – Q4 2008; percentage)

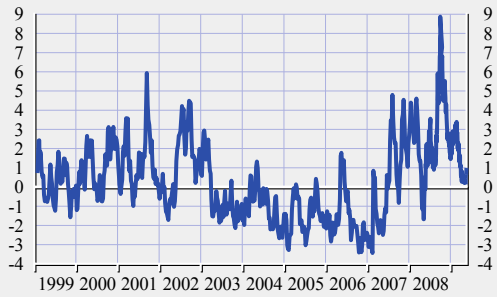



Sources: Lipper TASS and ECB calculations.
Note: Excluding funds of hedge funds. The directional group includes long/short equity hedge, global macro, emerging markets, dedicated short-bias and managed futures strategies. The relative value group consists of convertible arbitrage, fixed-income arbitrage and equity market-neutral strategies.

# 2 INTERNATIONAL FINANCIAL MARKETS

## Chart S18 Global risk aversion indicator

(Jan. 1999 – May 2009)




Sources: Chicago Board Options Exchange (CBOE), Merrill Lynch, UBS, Lehman Brothers, Westpac, Dresdner Kleinwort and ECB calculations.
Note: 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.

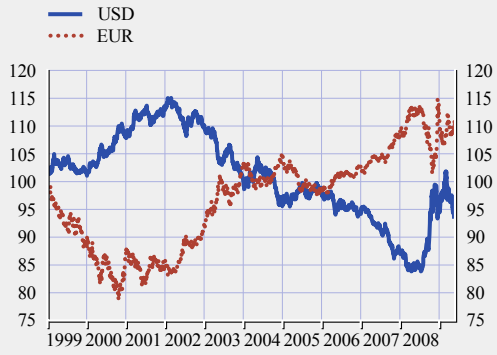
## Chart S19 Real broad USD effective exchange rate index

(Jan. 1999 – May 2009; index: Jan. 1999 = 100)


Source: US Federal Reserve Board.

## Chart S20 Selected nominal effective exchange rate indices

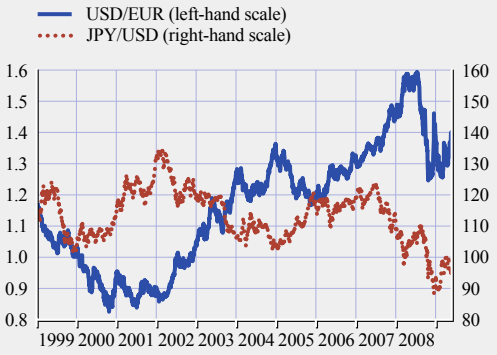
(Jan. 1999 – May 2009; index: Jan. 1999 = 100)




Sources: US Federal Reserve Board and ECB.

## Chart S21 Selected bilateral exchange rates

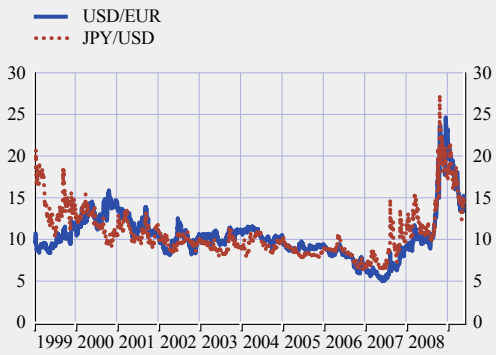
(Jan. 1999 – May 2009)




Source: ECB.

## Chart S22 Selected three-month implied foreign exchange market volatilities

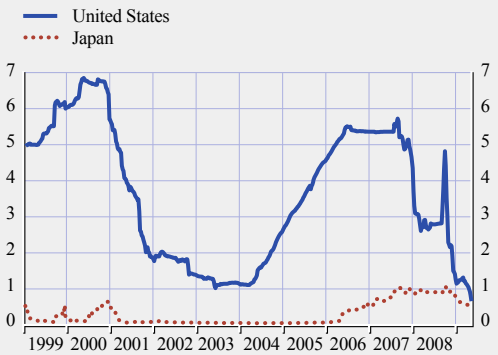
(Jan. 1999 – May 2009; percentage)




Source: Bloomberg.

## Chart S23 Three-month money market rates in the United States and Japan

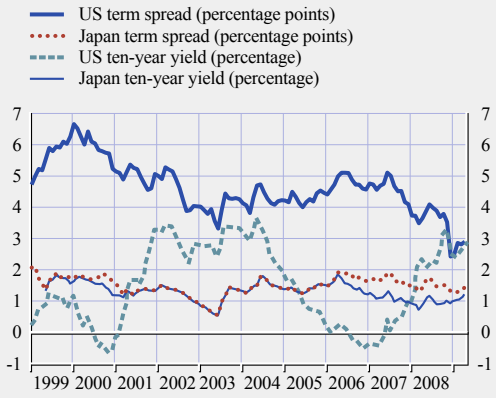
(Jan. 1999 – May 2009; LIBOR; percentage)




Source: Reuters.

## Chart S24 Government bond yields and term spreads in the United States and Japan

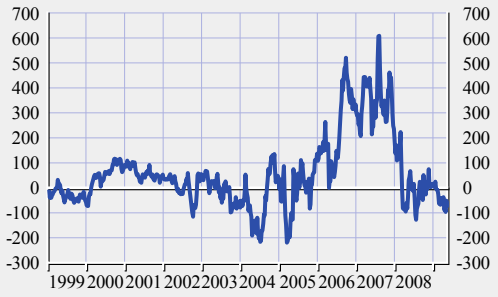
(Jan. 1999 – Apr. 2009)




Sources: Bloomberg and Reuters.
Note: The term spread is the difference between the ten-year bond yield and the three-month T-bill yield.

## Chart S25 Net non-commercial positions in ten-year US Treasury futures

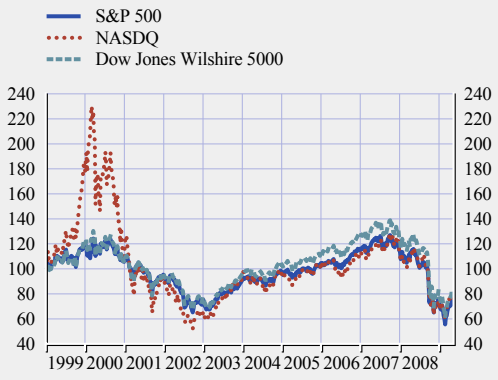
(Jan. 1999 – May 2009; thousands of contracts)




Source: Bloomberg.
Note: 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

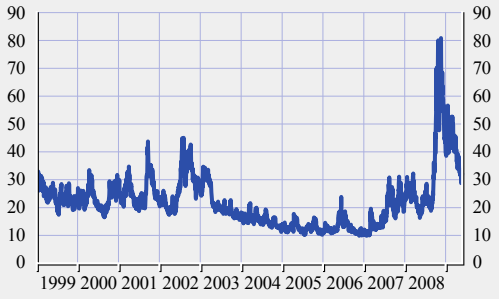
(Jan. 1999 – May 2009; index: Jan. 1999 = 100)




Sources: Bloomberg and Reuters.

## Chart S27 Implied volatility for the S&P 500 index

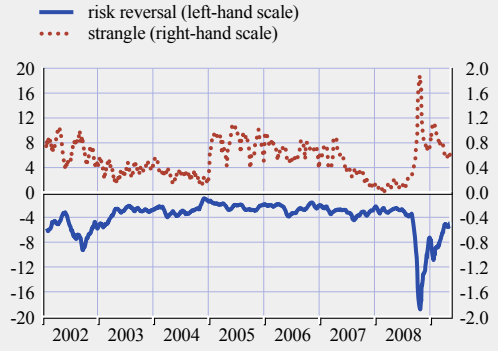
(Jan. 1999 – May 2009; percentage; CBOE Volatility Index (VIX))




Source: Thomson Financial Datastream.
Note: Data calculated by the Chicago Board Options Exchange (CBOE).

## Chart S28 Risk reversal and strangle of the S&P 500 index

(Feb. 2002 – May 2009; percentage; implied volatility; 20-day moving average)




Sources: Bloomberg and ECB calculations.
Note: 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 average at-the-money volatility of calls and puts with 50 delta.

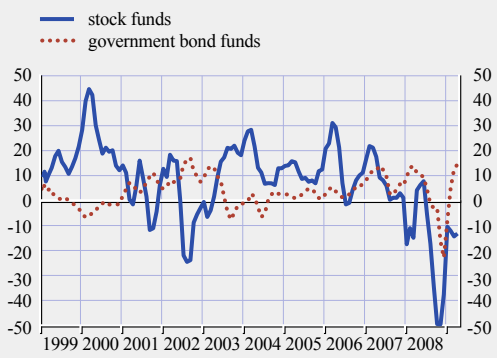
## Chart S29 Price-earnings (P/E) ratio for the US stock market

(Jan. 1985 – Apr. 2009; ten-year trailing earnings)


Sources: Thomson Financial 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 – Apr. 2009; USD billions; three-month moving average)




Source: Investment Company Institute.

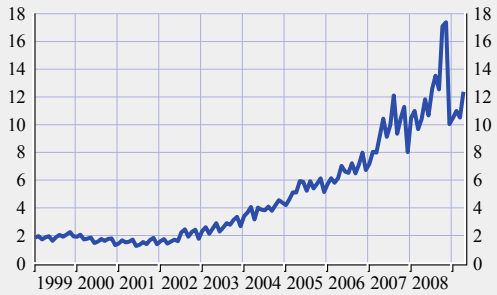
## Chart S31 Debit balances in New York Stock Exchange margin accounts

(Jan. 1999 – Apr. 2009; USD billions)


Source: New York Stock Exchange (NYSE).
Note: Borrowing to buy stocks "on margin" allows investors to use loans to pay for up to 50% of a stock's price.

## Chart S32 Open interest in options contracts on the S&P 500 index

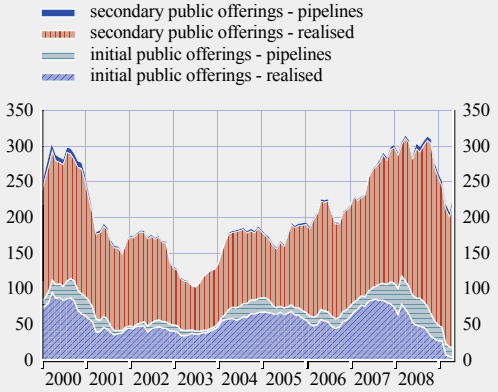
(Jan. 1999 – Apr. 2009; millions of contracts)




Source: Chicago Board Options Exchange (CBOE).

## Chart S33 Gross equity issuance in the United States

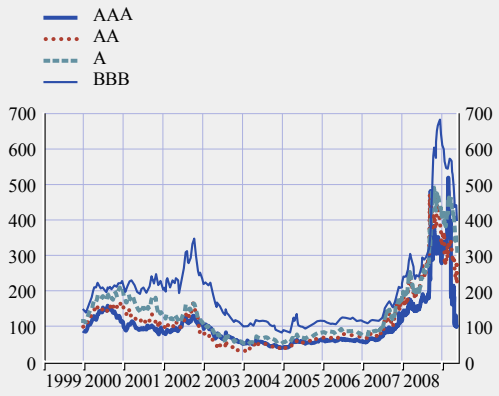
(Jan. 2000 – May 2009; USD billions; 12-month moving sums)




Source: Thomson Financial Datastream.

## Chart S34 US investment-grade corporate bond spreads

(Jan. 2000 – May 2009; basis points)




Source: JPMorgan Chase & Co.
Note: Spread between the seven to ten-year yield to maturity and the US seven to ten-year government bond yield.

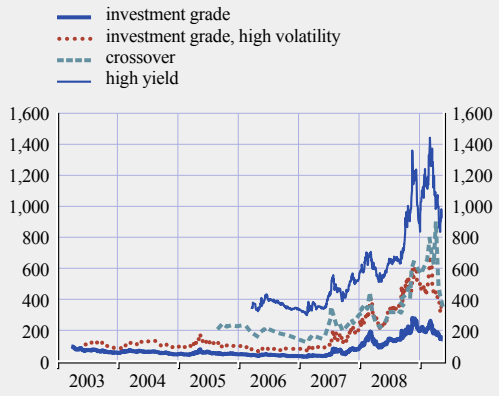
## Chart S35 US speculative-grade corporate bond spreads

(Jan. 1999 – May 2009; basis points)


Source: JPMorgan Chase & Co.
Note: The spread is between the yield to maturity of the US domestic high-yield index (BB+ rating or below, average maturity of seven years) and the US five-year government bond yield.

## Chart S36 US credit default swap indices

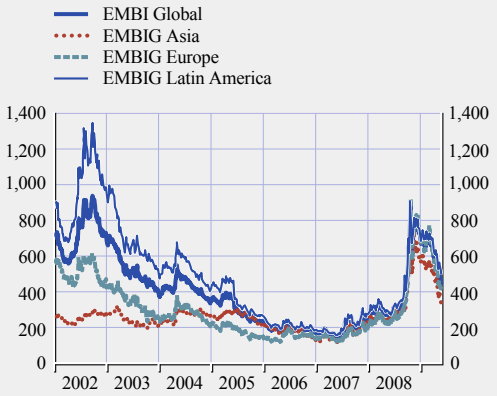
(Apr. 2003 – May 2009; basis points; five-year maturity)




Source: JPMorgan Chase & Co.

## Chart S37 Emerging market sovereign bond spreads

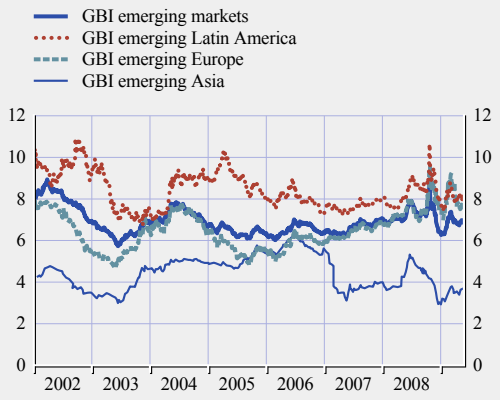
(Jan. 2002 – May 2009; basis points)




Source: JPMorgan Chase & Co.

## Chart S38 Emerging market local currency sovereign bond yields

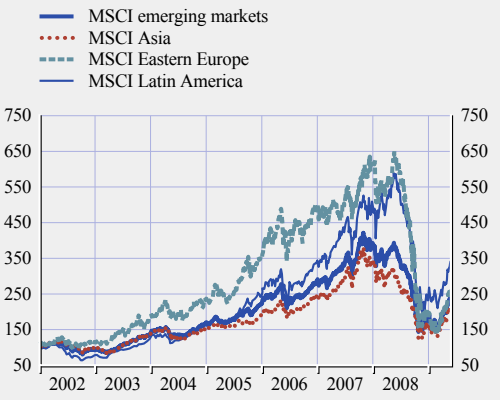
(Jan. 2002 – May 2009; percentage)




Source: Bloomberg.
Note: GBI stands for Government Bond Index

## Chart S39 Emerging market stock price indices

(Jan. 2002 – May 2009; index: Jan. 2002 = 100)




Source: Bloomberg.
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 | Jan.-Apr. 2009 |
|---|---|---|---|---|---|---|---|---|
| **Asia** | **24,047** | **34,854** | **42,580** | **47,200** | **45,767** | **52,353** | **34,332** | **20,996** |
| *of which* | | | | | | | | |
| South Korea | 8,625 | 9,249 | 15,033 | 15,556 | 15,976 | 20,637 | 12,860 | 11,408 |
| Hong Kong | 536 | 11,523 | 4,123 | 5,939 | 5,517 | 5,314 | 3,915 | 1,718 |
| Singapore | 378 | 3,300 | 4,601 | 6,034 | 4,135 | 4,538 | 1,591 | 129 |
| India | - | 300 | 2,191 | 224 | 1,970 | 8,180 | 1,408 | - |
| China | 743 | 1,986 | 4,526 | 3,194 | 2,054 | 2,177 | 1,615 | - |
| Malaysia | 4,870 | 299 | 3,114 | 2,434 | 1,619 | 300 | 440 | - |
| Thailand | - | 300 | 1,396 | 1,783 | 1,271 | 761 | 524 | - |
| **Latin America** | **17,568** | **31,816** | **33,663** | **71,163** | **33,608** | **43,456** | **19,619** | **10,086** |
| *of which* | | | | | | | | |
| Brazil | 5,481 | 11,420 | 9,037 | 17,446 | 16,596 | 11,106 | 7,233 | 2,677 |
| Mexico | 5,548 | 11,029 | 14,068 | 6,119 | 5,688 | 9,477 | 5,820 | 3,458 |
| Venezuela | 1,042 | 4,393 | 4,440 | 6,066 | 731 | 10,078 | 5,029 | 204 |
| Colombia | 981 | 1,292 | 1,341 | 2,201 | 3,293 | 3,128 | 1,136 | 1,991 |
| Chile | 1,297 | 991 | 1,241 | - | 895 | 250 | 100 | 589 |
| Argentina | - | 99 | 1,011 | 35,933 | 1,450 | 3,272 | - | - |
| **Emerging Europe** | **17,277** | **16,688** | **25,660** | **28,680** | **37,497** | **42,440** | **27,321** | **3,688** |
| *of which* | | | | | | | | |
| Russian Federation | 3,317 | 8,579 | 16,333 | 17,075 | 25,104 | 32,913 | 21,040 | 2,688 |
| Ukraine | 403 | 1,250 | 2,058 | 1,709 | 2,757 | 3,389 | 854 | - |
| Croatia | 640 | 538 | 1,096 | - | 385 | 742 | - | - |

Source: Dealogic (DCM Analytics).
Notes: Regions are defined as follows. Asia: Brunei, Burma, China, Special Administrative Region of Hong Kong, India, Indonesia, Laos, Macau, Malaysia, Nauru, North Korea, the Philippines, Samoa, Singapore, South Korea, Taiwan, Thailand and Vietnam. Emerging Europe: Bulgaria, Croatia, Romania, Russia, Turkey and Ukraine. Latin America: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela.

## Chart S40 Oil price and oil futures prices

(Jan. 1999 – June 2010; USD per barrel)


Source: Bloomberg.

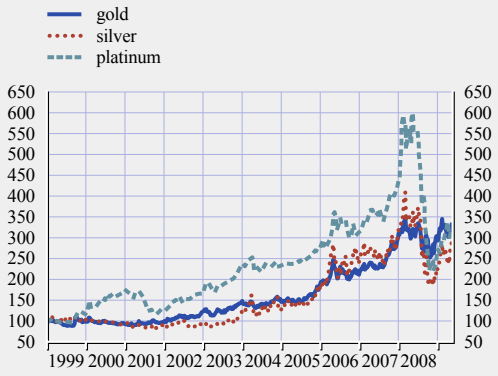
## Chart S41 Crude oil futures contracts

(Jan. 1999 – May 2009; thousands of contracts)


Source: Bloomberg.
Note: Futures traded on the New York Mercantile Exchange. Non-commercial futures contracts are contracts bought for purposes other than hedging.

## Chart S42 Precious metals prices

(Jan. 1999 – May 2009; index: Jan. 1999 = 100)




Source: Bloomberg.
Note: The indices are based on prices in USD.

# 3 EURO AREA ENVIRONMENT

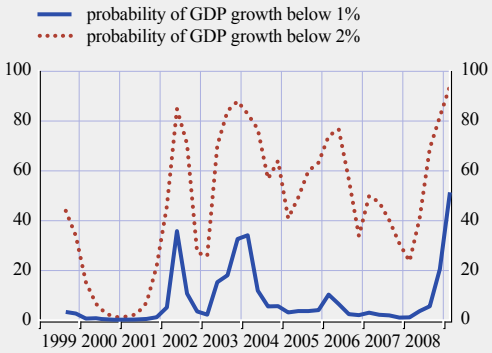
## Chart S43 Real GDP growth in the euro area

(Q1 1999 – Q1 2009; percentage change)


Source: Eurostat.

## Chart S44 Survey-based estimates of the four-quarter-ahead downside risk of weak real GDP growth in the euro area

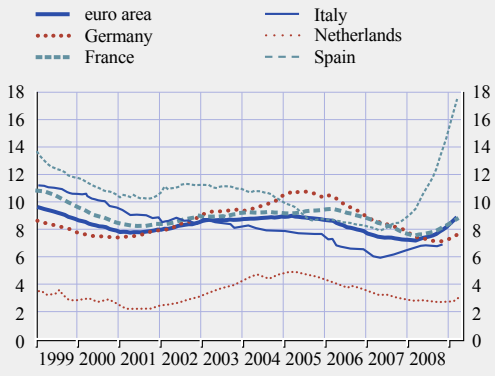
(Q3 1999 – Q1 2009; percentage)




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 below the indicated threshold.

## Chart S45 Unemployment rate in the euro area and in selected euro area countries

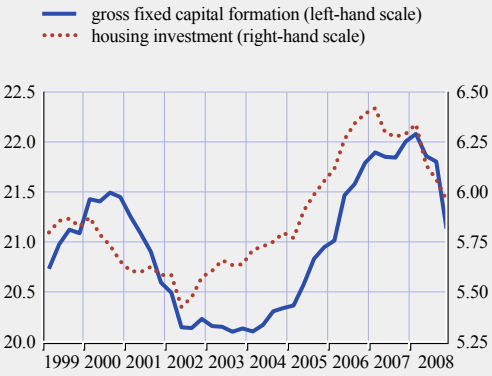
(Jan. 1999 – Mar. 2009; percentage)




Source: Eurostat.

## Chart S46 Gross fixed capital formation and housing investment in the euro area

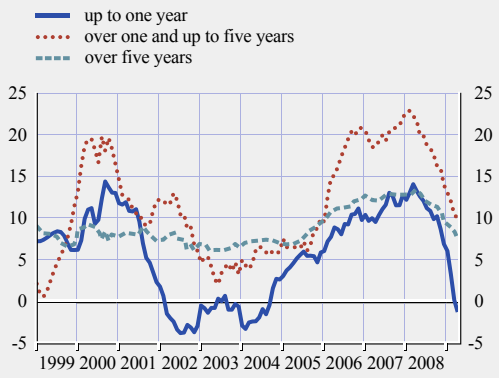
(Q1 1999 – Q4 2008; percentage of GDP)




Sources: Eurostat and ECB calculations.

## Chart S47 Annual growth in MFI loans to non-financial corporations in the euro area for selected maturities

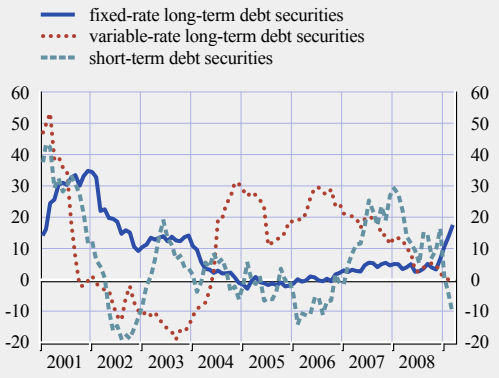
(Jan. 1999 – Apr. 2009; percentage change per annum)




Source: ECB.
Note: Data are based on financial transactions of monetary financial institution (MFI) loans.

## Chart S48 Annual growth in debt securities issued by non-financial corporations in the euro area

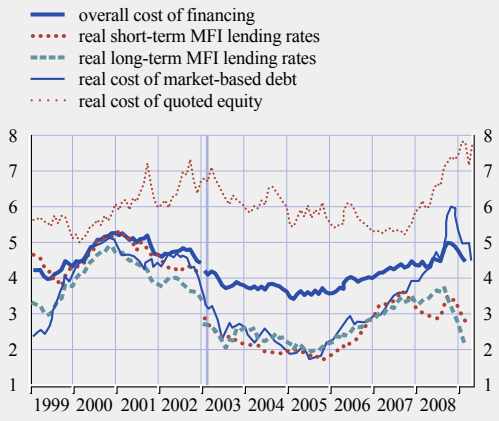
(Jan. 2001 – Mar. 2009; percentage change per annum; outstanding amounts)




Source: ECB.

## Chart S49 Real cost of external financing of euro area non-financial corporations

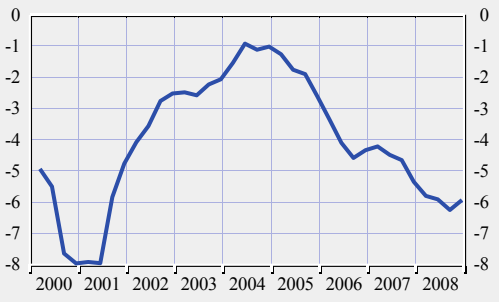
(Jan. 1999 – May 2009; percentage)




Sources: ECB, Thomson Financial Datastream, Merrill Lynch, Consensus Economics Forecast and ECB calculations.
Note: 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

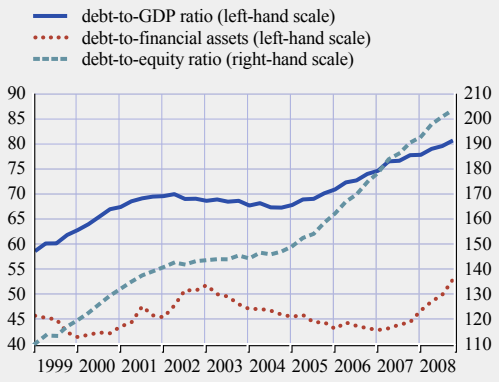
(Q1 2000 – Q4 2008; percentage of gross value added of non-financial corporations; four-quarter moving sum)




Sources: ECB and ECB calculations.

## Chart S51 Total debt of non-financial corporations in the euro area

(Q1 1999 – Q4 2008; percentage)




Sources: ECB and ECB calculations.
Note: Data for the last quarter are partly based on estimates. 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.

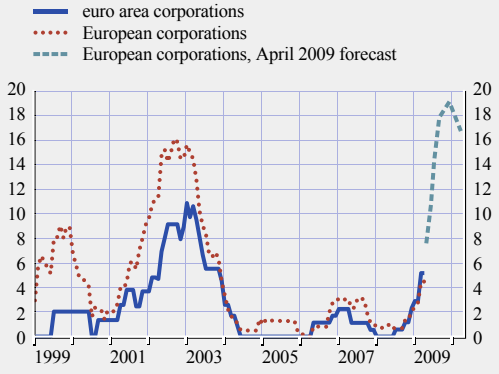
## Chart S52 Earnings per share (EPS) growth and 12-month ahead growth forecast for euro area non-financial corporations

(Jan. 2005 – Apr. 2010; percentage change per annum)


Sources: Thomson Financial Datastream and ECB calculations.

## Chart S53 Euro area and European speculative-grade-rated corporations' default rates and forecast

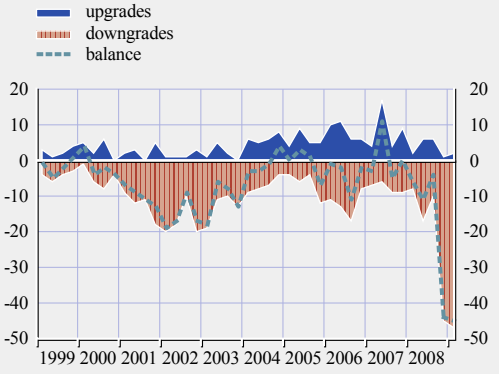
(Jan. 1999 – Apr. 2010; percentage; 12-month trailing sum)




Source: Moody's.

## Chart S54 Euro area non-financial corporations' rating changes

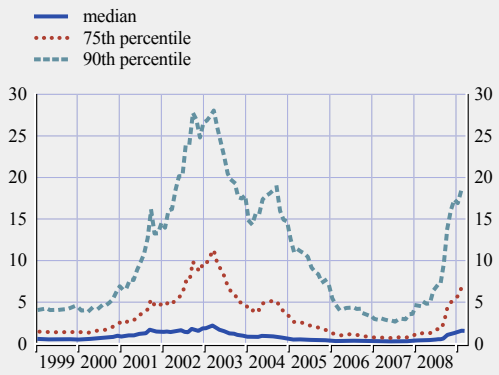
(Q1 1999 – Q1 2009; number)




Source: Moody's.

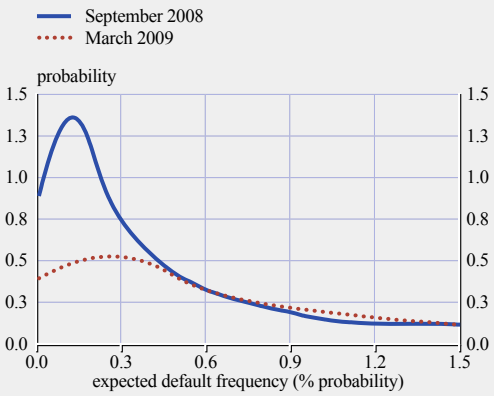
## Chart S55 Expected default frequency (EDF) of euro area non-financial corporations

(Jan. 1999 – Mar. 2009; percentage probability)



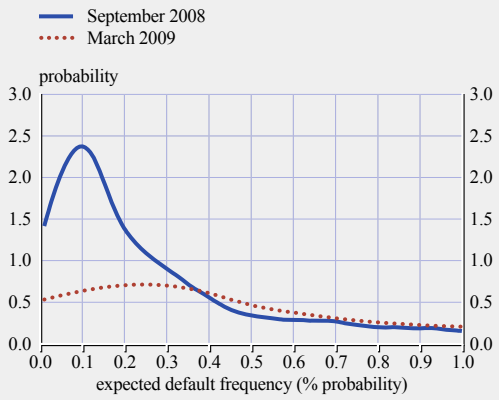

Sources: Moody's KMV and ECB calculations.
Note: The EDF provides an estimate of the probability of default over the following year. Due to measurement considerations, the EDF values are restricted by Moody's KMV to the interval between 0.01% and 35%.

## Chart S56 Expected default frequency (EDF) distributions for non-financial corporations



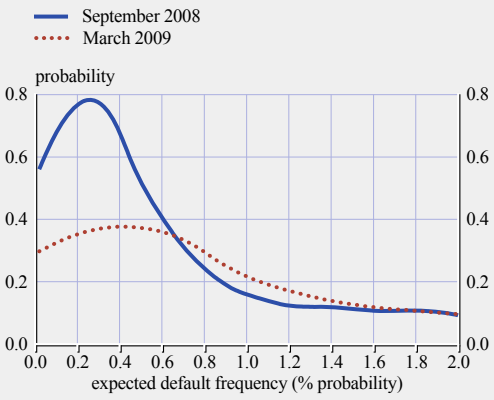

Sources: Moody's KMV and ECB calculations.
Note: The EDF provides an estimate of the probability of default over the following year.

## Chart S57 Expected default frequency (EDF) distributions for large euro area non-financial corporations




Sources: Moody's KMV and ECB calculations.
Note: 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.

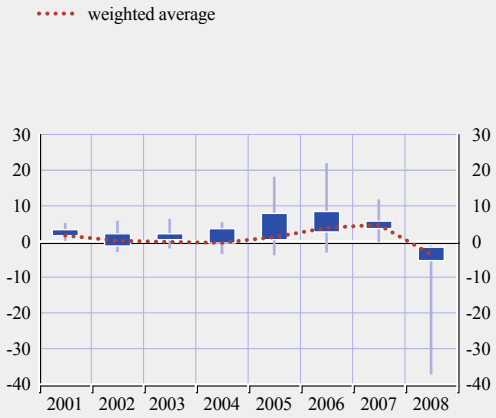
## Chart S58 Expected default frequency (EDF) distributions for small euro area non-financial corporations




Sources: Moody's KMV and ECB calculations.
Note: 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

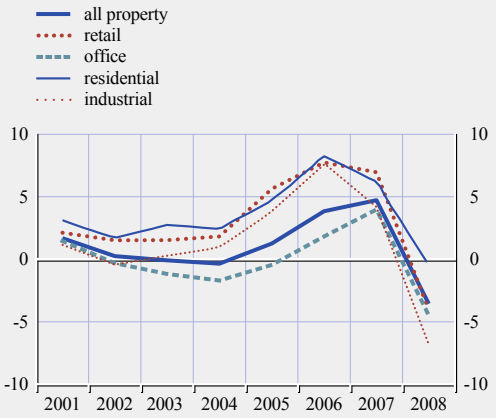
(2001 – 2008; capital values; percentage change per annum; minimum, maximum and interquartile distribution of country-level data)




Sources: Investment Property Databank and ECB calculations.
Note: 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.

## Chart S60 Euro area commercial property capital value changes in different sectors

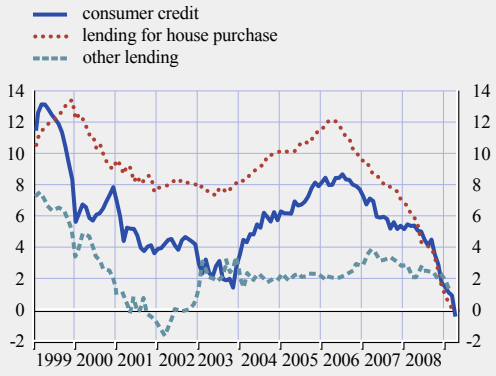
(2001 – 2008; capital values; percentage change per annum)




Sources: Investment Property Databank and ECB calculations.
Note: 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.

## Chart S61 Annual growth in MFI loans to households in the euro area

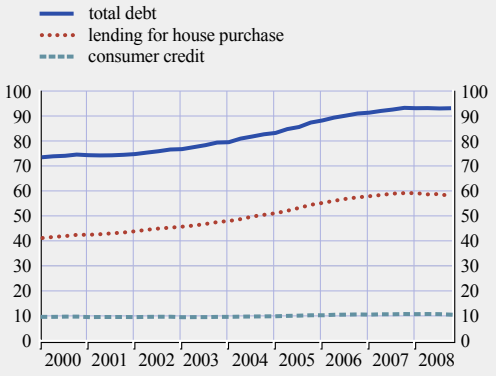
(Jan. 1999 – Apr. 2009; percentage change per annum)




Source: ECB.
Note: Data are based on financial transactions of MFI loans.

## Chart S62 Household debt-to-disposable income ratios in the euro area

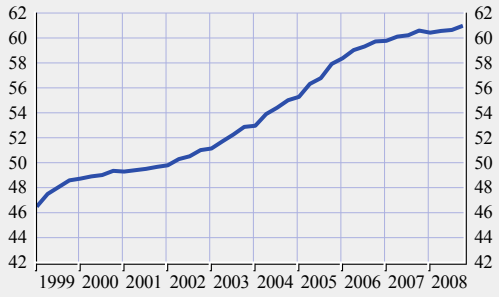
(Q1 2000 – Q4 2008; percentage of disposable income)




Source: ECB.
Note: These series are the four-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

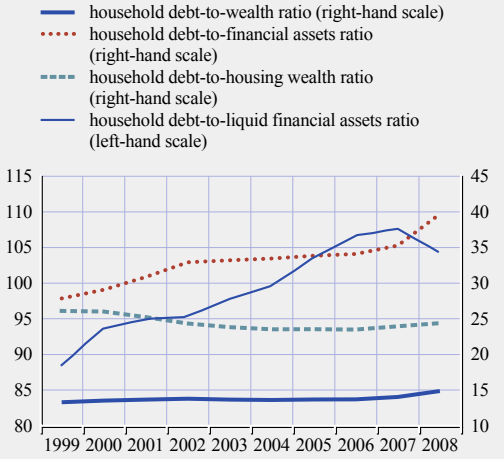
(Q1 1999 – Q4 2008; percentage)




Sources: ECB and Eurostat.

## Chart S64 Household debt-to-assets ratios in the euro area

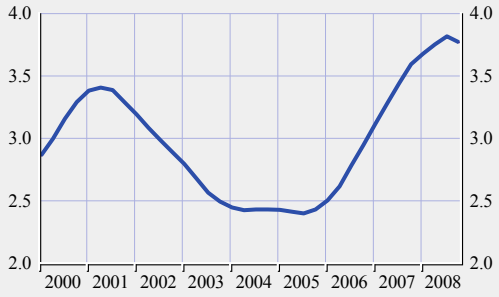
(1999 – 2008; percentage)




Source: ECB.
Note: Data for 2006 and 2007 are based on estimates. Household debt comprises total loans to households from all institutional sectors, including the rest of the world. Interest payments do not include the full financing costs paid by households, as they exclude the fees for financial services.

## Chart S65 Interest payment burden of the euro area household sector

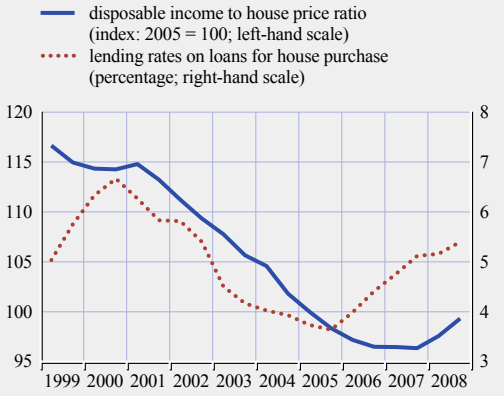
(Q1 2000 – Q4 2008; percentage of disposable income)




Sources: ECB and ECB calculations.

## Chart S66 Narrow housing affordability and borrowing conditions in the euro area

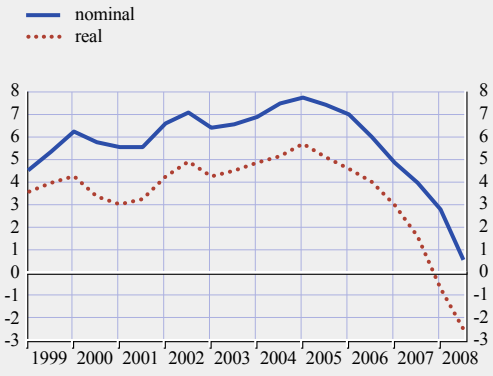
(H1 1999 – H2 2008)




Sources: Eurostat and ECB calculations.
Note: The above narrow measure of housing affordability is defined as the ratio of gross nominal disposable income to the nominal house price index.

## Chart S67 Residential property price changes in the euro area

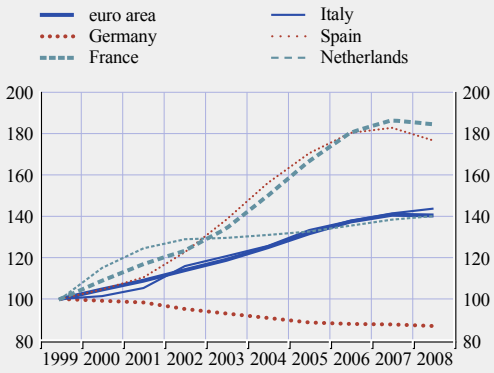
(H1 1999 – H2 2008; percentage change per annum)




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 Residential property price changes in euro area countries

(percentage change per annum)

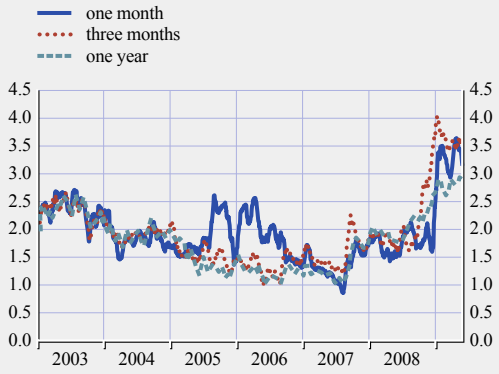
| | Weight | 1999-2005 | 2006 | 2007 | 2008 | 2008 | | 2008 | | | | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | H1 | H2 | Q1 | Q2 | Q3 | Q4 | Q1 |
| Belgium[1] | 3.7 | 9.2 | 11.1 | 9.2 | .. | .. | .. | .. | .. | .. | .. | .. |
| Germany[2] | 26.9 | -0.6 | 0.2 | 0.7 | 0.2 | .. | .. | .. | .. | .. | .. | .. |
| Ireland[2] | 2.0 | 13.6 | 13.4 | 0.9 | -9.4 | -9.0 | -9.8 | -8.6 | -9.4 | -10.0 | -9.7 | -9.8 |
| Greece[2] | 2.6 | 9.4 | 12.2 | 4.6 | 2.6 | 2.6 | 2.7 | 1.7 | 3.5 | 2.4 | 2.9 | .. |
| Spain[2] | 11.8 | 12.9 | 10.4 | 5.8 | 0.7 | 2.9 | -1.4 | 3.8 | 2.0 | 0.4 | -3.2 | -6.8 |
| France[1] | 21.0 | 10.6 | 12.1 | 6.6 | 1.2 | 3.7 | -1.1 | 4.3 | 3.0 | 0.8 | -3.0 | -6.6 |
| Italy[2] | 17.0 | 6.5 | 5.8 | 4.9 | 4.2 | 4.5 | 3.9 | .. | .. | .. | .. | .. |
| Cyprus[2] | 0.2 | .. | 10.0 | 15.0 | 13.0 | .. | .. | .. | .. | .. | .. | .. |
| Luxembourg[2] | 0.4 | 10.4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Malta[2] | 0.1 | 9.7 | 3.5 | 1.1 | -2.7 | -1.7 | -3.8 | -0.7 | -2.7 | -3.2 | -4.4 | .. |
| Netherlands[1] | 6.4 | 9.0 | 4.6 | 4.2 | 2.9 | 3.7 | 2.2 | 4.2 | 3.1 | 2.8 | 1.7 | -0.3 |
| Austria[2,3] | 3.0 | 0.3 | 4.0 | 4.1 | 1.3 | 1.0 | 1.6 | 2.1 | -0.2 | 0.7 | 2.5 | 4.3 |
| Portugal[2] | 1.8 | 3.8 | 2.1 | 1.3 | 3.9 | 3.1 | 4.7 | 2.3 | 4.0 | 4.8 | 4.7 | 2.7 |
| Slovenia[4] | 0.4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Slovakia[1] | 0.7 | .. | 16.8 | 23.9 | .. | 32.8 | .. | 34.5 | 31.2 | 19.9 | .. | .. |
| Finland[1] | 2.0 | 5.9 | 7.4 | 5.9 | 0.9 | 3.2 | -1.4 | 3.7 | 2.7 | 0.6 | -3.4 | .. |
| Euro area | 100 | 6.4 | 6.5 | 4.4 | 1.7 | 2.8 | 0.6 | .. | .. | .. | .. | .. |

Sources: National sources and ECB calculations.
Notes: Weights are based on 2008 nominal GDP. The estimates of the euro area aggregate for the first and second half 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) Data for Slovenia are confidential.

# 4 EURO AREA FINANCIAL MARKETS

## Chart S69 Bid-ask spreads for EONIA swap rates

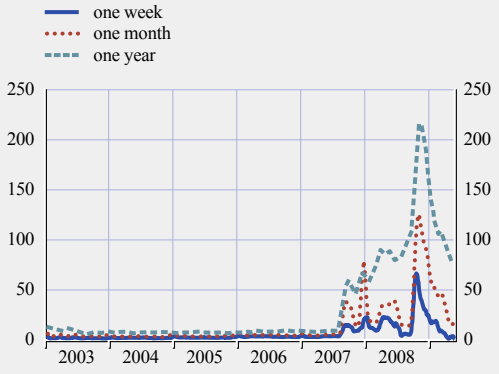
(Jan. 2003 – May 2009; basis points; 20-day moving average; transaction-weighted)




Source: Reuters.

## Chart S70 Euro area spreads between interbank deposit and repo interest rates

(Jan. 2003 – May 2009; basis points; 20-day moving average)




Source: Reuters.

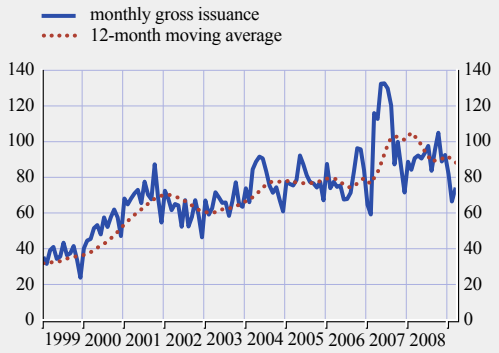
## Chart S71 Implied volatility of three-month EURIBOR futures

(Apr. 1999 – May 2009; percentage; 60-day moving average)


Source: Bloomberg.

## Chart S72 Monthly gross issuance of short-term securities (other than shares) by euro area non-financial corporations

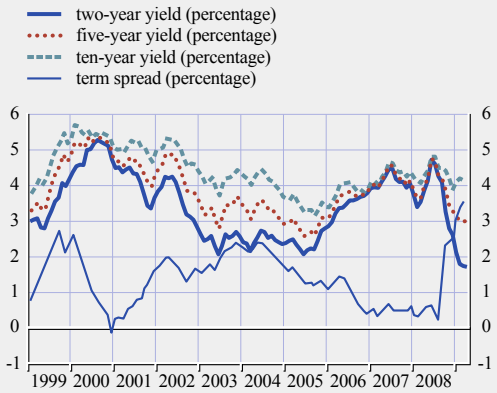
(Jan. 1999 – Mar. 2009; EUR billions; maturities up to one year)




Source: ECB.

## Chart S73 Euro area government bond yields and term spread

(Jan. 1999 – Apr. 2009)




Sources: ECB and Bloomberg.
Note: The term spread is the difference between the ten-year bond yield and the three-month T-bill yield.

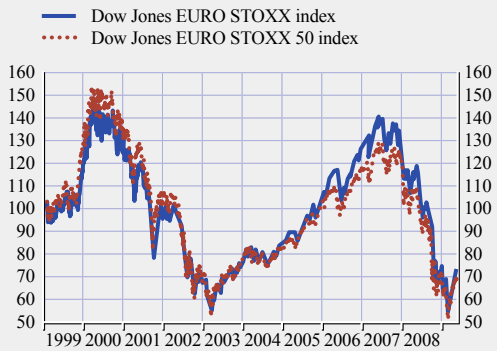
## Chart S74 Option-implied volatility for ten-year government bond yields in Germany

(Jan. 1999 – May 2009; percentage; implied volatility; 20-day moving average)


Source: Bloomberg.

## Chart S75 Stock prices in the euro area

(Jan. 1999 – May 2009; index: Jan. 1999 = 100)




Source: Bloomberg.

## Chart S76 Implied volatility for the Dow Jones EURO STOXX 50 index

(Jan. 1999 – May 2009; percentage)


Source: Bloomberg.

## Chart S77 Risk reversal and strangle of the Dow Jones EURO STOXX 50 index

(Jan. 2004 – May 2009; percentage; implied volatility; 20-day moving average)


Sources: Bloomberg and ECB calculations.
Note: 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 average at-the-money volatility of calls and puts with 50 delta.

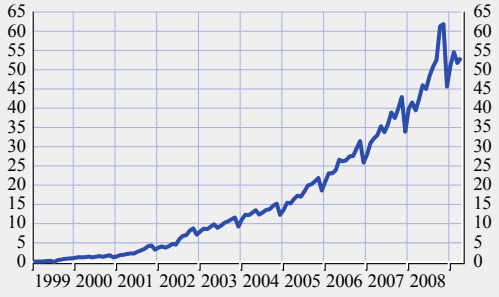
## Chart S78 Price-earnings (P/E) ratio for the euro area stock market

(Jan. 1985 – Apr. 2009; ten-year trailing earnings)


Sources: Thomson Financial 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

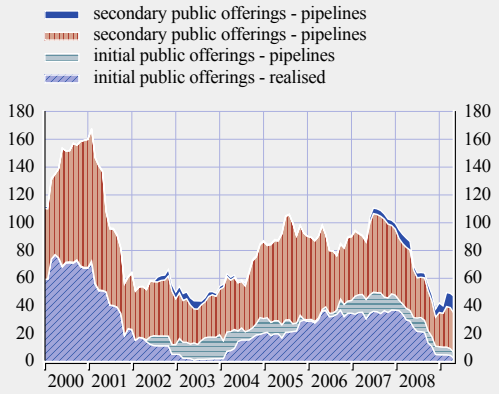
(Jan. 1999 – Apr. 2009; ten-year trailing earnings)




Source: Eurex.

## Chart S80 Gross equity issuance and pipeline deals in the euro area

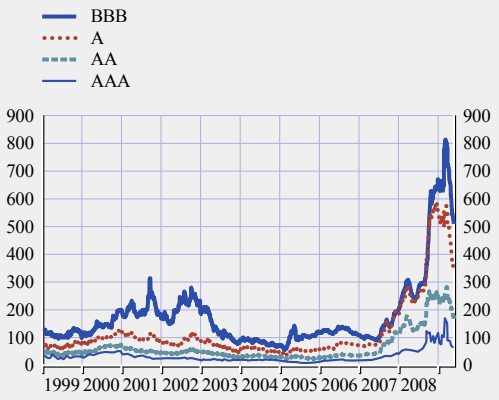
(Jan. 2000 – Apr. 2009; EUR billions; 12-month moving sums)




Source: Thomson Financial Datastream.

## Chart S81 Investment-grade corporate bond spreads in the euro area

(Jan. 1999 – May 2009; basis points)




Source: Thomson Financial Datastream.
Note: Spread between the seven to ten-year yield to maturity and the euro area seven to ten-year government bond yield.

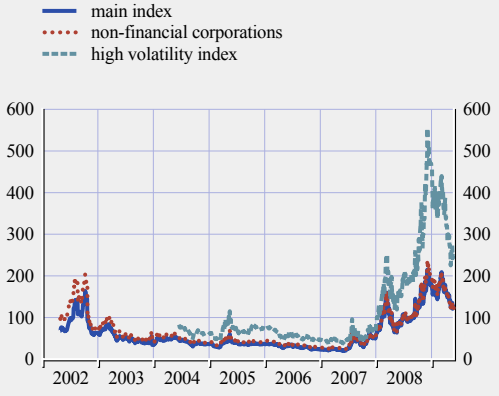
## Chart S82 Speculative-grade corporate bond spreads in the euro area

(Jan. 1999 – May 2009; basis points)


Source: JPMorgan Chase & Co.
Note: Spread between the yield to maturity of the euro area high-yield index (BB+ rating or below, average maturity of 5.9 years) and the euro area five-year government bond yield.

## Chart S83 iTraxx Europe five-year credit default swap indices

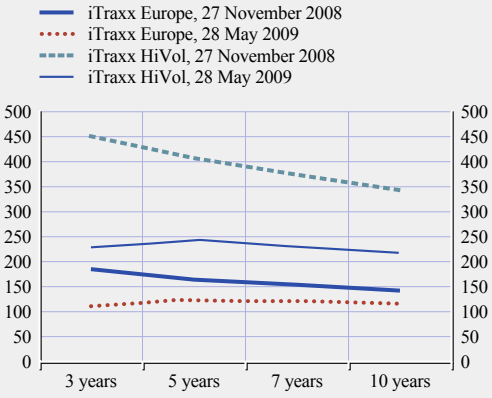
(May 2002 – May 2009; basis points)




Source: JPMorgan Chase & Co.

## Chart S84 Term structures of premiums for iTraxx Europe and HiVol

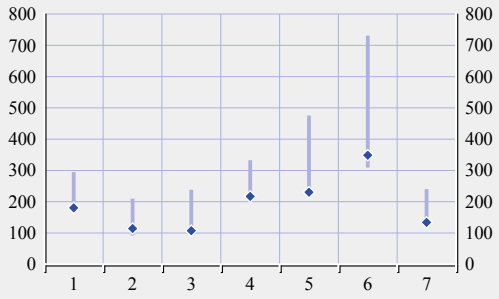
(basis points)




Source: JPMorgan Chase & Co.

## Chart S85 iTraxx sector indices

(Nov. 2008 – May 2009; basis points)




1 main index
2 financials
3 energy
4 consumer
5 industrials
6 autos
7 TMT

Source: Bloomberg.
Note: The diamonds show the most recent observation 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 – Q1 2009)

| | Min. | 1st quartile | Median | Average | *Weighted average* | 3rd quartile | Max. |
|---|---|---|---|---|---|---|---|
| **Return on shareholders' equity (%)** | | | | | | | |
| 2004 | -29.47 | 6.35 | 9.64 | 8.68 | *10.17* | 14.31 | 26.66 |
| 2005 | 5.66 | 8.63 | 10.84 | 11.70 | *11.56* | 12.84 | 29.20 |
| 2006 | 4.79 | 9.90 | 12.50 | 12.94 | *12.88* | 15.43 | 26.01 |
| 2007 | -36.15 | 6.54 | 11.23 | 8.95 | *11.74* | 14.45 | 24.69 |
| 2008 | -58.49 | -13.74 | 1.23 | -4.96 | *1.88* | 6.08 | 18.88 |
| Q1 2009 | -142.07 | 1.24 | 6.50 | -5.78 | *2.24* | 12.93 | 21.20 |
| **Return on risk-weighted assets (%)** | | | | | | | |
| 2004 | -1.22 | 0.55 | 1.03 | 0.92 | *1.03* | 1.41 | 2.03 |
| 2005 | 0.33 | 0.89 | 1.04 | 1.16 | *1.23* | 1.52 | 2.26 |
| 2006 | 0.35 | 0.93 | 1.31 | 1.36 | *1.40* | 1.71 | 2.66 |
| 2007 | -1.53 | 0.73 | 0.97 | 1.04 | *1.17* | 1.66 | 2.55 |
| 2008 | -2.57 | -1.18 | 0.08 | -0.18 | *0.18* | 0.67 | 1.77 |
| Q1 2009 | -10.13 | 0.15 | 0.57 | -0.33 | *0.22* | 1.16 | 1.69 |
| **Net interest income (% total assets)** | | | | | | | |
| 2004 | 0.51 | 0.61 | 0.82 | 0.99 | *0.93* | 1.30 | 1.90 |
| 2005 | 0.45 | 0.55 | 0.61 | 0.90 | *0.89* | 1.28 | 1.87 |
| 2006 | 0.24 | 0.48 | 0.67 | 0.89 | *0.89* | 1.20 | 2.03 |
| 2007 | 0.26 | 0.47 | 0.66 | 0.86 | *0.85* | 1.20 | 1.95 |
| 2008 | 0.42 | 0.63 | 0.76 | 1.07 | *1.02* | 1.48 | 2.19 |
| Q1 2009 | 0.40 | 0.62 | 1.22 | 1.28 | *1.28* | 1.78 | 2.44 |
| **Net trading income (% total assets)** | | | | | | | |
| 2004 | -0.01 | 0.06 | 0.21 | 0.23 | *0.26* | 0.32 | 0.74 |
| 2005 | 0.01 | 0.09 | 0.17 | 0.24 | *0.28* | 0.32 | 0.83 |
| 2006 | 0.04 | 0.10 | 0.22 | 0.31 | *0.34* | 0.48 | 1.08 |
| 2007 | -0.56 | 0.00 | 0.17 | 0.23 | *0.30* | 0.48 | 0.96 |
| 2008 | -0.98 | -0.27 | -0.09 | -0.13 | *-0.08* | 0.02 | 0.41 |
| Q1 2009 | -4.31 | 0.02 | 0.16 | -0.25 | *0.01* | 0.29 | 0.43 |
| **Fees and commissions (% total assets)** | | | | | | | |
| 2004 | 0.10 | 0.27 | 0.48 | 0.59 | *0.58* | 0.88 | 1.28 |
| 2005 | 0.11 | 0.27 | 0.38 | 0.52 | *0.56* | 0.78 | 1.27 |
| 2006 | 0.11 | 0.24 | 0.47 | 0.53 | *0.58* | 0.77 | 1.10 |
| 2007 | 0.09 | 0.28 | 0.52 | 0.53 | *0.57* | 0.65 | 1.10 |
| 2008 | 0.12 | 0.22 | 0.46 | 0.46 | *0.48* | 0.66 | 0.92 |
| Q1 2009 | 0.11 | 0.22 | 0.36 | 0.44 | *0.48* | 0.75 | 0.79 |
| **Other income (% total assets)** | | | | | | | |
| 2004 | 0.04 | 0.05 | 0.12 | 0.15 | *0.13* | 0.15 | 0.63 |
| 2005 | -0.02 | 0.06 | 0.13 | 0.14 | *0.14* | 0.15 | 0.64 |
| 2006 | 0.00 | 0.07 | 0.13 | 0.18 | *0.15* | 0.21 | 0.71 |
| 2007 | -0.05 | 0.07 | 0.12 | 0.16 | *0.15* | 0.21 | 0.51 |
| 2008 | -0.54 | -0.14 | 0.11 | 0.02 | *0.05* | 0.21 | 0.38 |
| Q1 2009 | -0.21 | 0.02 | 0.04 | 0.08 | *0.01* | 0.11 | 0.36 |
| **Total operating income (% total assets)** | | | | | | | |
| 2004 | 0.82 | 1.29 | 1.76 | 1.96 | 1.90 | 2.57 | 3.38 |
| 2005 | 0.78 | 1.28 | 1.58 | 1.80 | 1.86 | 2.24 | 3.32 |
| 2006 | 0.76 | 1.30 | 1.82 | 1.90 | 1.96 | 2.35 | 3.81 |
| 2007 | 0.10 | 1.30 | 1.68 | 1.78 | 1.87 | 2.22 | 3.61 |
| 2008 | -0.19 | 0.61 | 1.29 | 1.42 | 1.47 | 1.94 | 3.65 |
| Q1 2009 | -0.46 | 0.24 | 0.34 | 0.39 | 0.44 | 0.64 | 0.90 |
| **Net income (% total assets)** | | | | | | | |
| 2004 | -0.46 | 0.25 | 0.38 | 0.38 | 0.40 | 0.51 | 0.92 |
| 2005 | 0.10 | 0.34 | 0.42 | 0.46 | 0.48 | 0.49 | 0.97 |
| 2006 | 0.16 | 0.29 | 0.50 | 0.53 | 0.52 | 0.67 | 1.15 |
| 2007 | -0.56 | 0.21 | 0.38 | 0.42 | 0.44 | 0.51 | 1.22 |
| 2008 | -1.21 | -0.35 | 0.03 | 0.00 | 0.06 | 0.39 | 0.92 |
| Q1 2009 | -4.15 | 0.06 | 0.19 | -0.11 | 0.07 | 0.30 | 0.91 |

## Table S5 Financial condition of large and complex banking groups in the euro area (continued)

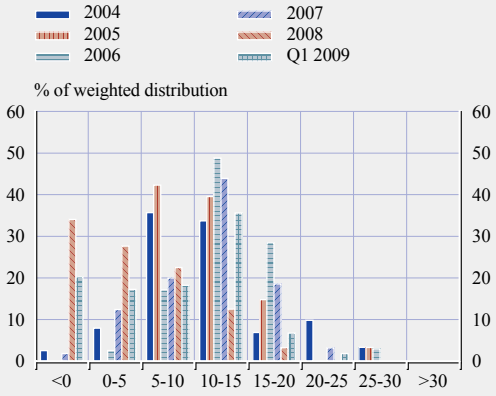
(2004 – Q1 2009)

| | Min. | 1st quartile | Median | Average | *Weighted average* | 3rd quartile | Max. |
|---|---|---|---|---|---|---|---|
| **Net loan impairment charges (% total assets)** | | | | | | | |
| 2004 | 0.04 | 0.05 | 0.08 | 0.12 | *0.11* | 0.14 | 0.40 |
| 2005 | 0.00 | 0.03 | 0.06 | 0.09 | *0.09* | 0.12 | 0.29 |
| 2006 | 0.02 | 0.04 | 0.07 | 0.10 | *0.10* | 0.10 | 0.36 |
| 2007 | 0.01 | 0.04 | 0.05 | 0.09 | *0.08* | 0.08 | 0.38 |
| 2008 | 0.03 | 0.11 | 0.19 | 0.23 | *0.21* | 0.30 | 0.57 |
| Q1 2009 | -0.80 | 0.07 | 0.19 | 0.12 | *0.10* | 0.32 | 0.40 |
| **Cost-to-income ratio (%)** | | | | | | | |
| 2004 | 44.40 | 55.53 | 64.55 | 63.30 | *65.10* | 69.78 | 79.90 |
| 2005 | 46.66 | 54.60 | 62.80 | 62.17 | *62.65* | 66.60 | 89.93 |
| 2006 | 42.55 | 54.78 | 58.85 | 60.29 | *60.74* | 64.70 | 92.37 |
| 2007 | 41.25 | 55.39 | 64.68 | 105.08 | *78.57* | 70.05 | 921.64 |
| 2008 | -326.30 | 61.20 | 70.99 | 99.78 | *92.83* | 115.85 | 771.10 |
| Q1 2009 | -76.70 | 44.93 | 56.15 | 48.09 | *57.01* | 60.68 | 89.20 |
| **Tier 1 ratio (%)** | | | | | | | |
| 2004 | 6.50 | 7.42 | 7.93 | 8.22 | *8.14* | 8.88 | 10.90 |
| 2005 | 6.70 | 7.60 | 8.10 | 8.32 | *8.20* | 8.83 | 11.60 |
| 2006 | 6.70 | 7.58 | 7.95 | 8.26 | *8.12* | 8.77 | 10.50 |
| 2007 | 6.50 | 7.30 | 7.76 | 7.93 | *7.83* | 8.60 | 10.70 |
| 2008 | 6.40 | 7.70 | 8.15 | 8.62 | *8.77* | 9.48 | 12.70 |
| Q1 2009 | 5.90 | 7.15 | 8.70 | 8.31 | *8.69* | 9.40 | 10.70 |
| **Overall solvency ratio (%)** | | | | | | | |
| 2004 | 8.50 | 10.73 | 11.64 | 11.50 | *11.20* | 12.50 | 13.20 |
| 2005 | 8.50 | 10.75 | 11.50 | 11.53 | *11.33* | 12.34 | 14.20 |
| 2006 | 10.00 | 10.58 | 11.06 | 11.27 | *11.23* | 11.85 | 12.90 |
| 2007 | 8.80 | 9.68 | 10.50 | 10.67 | *10.61* | 11.45 | 13.00 |
| 2008 | 9.30 | 11.30 | 12.20 | 11.96 | *11.96* | 12.78 | 13.90 |
| Q1 2009 | 8.70 | 10.60 | 11.30 | 11.21 | *11.47* | 11.68 | 13.60 |

Sources: Individual institutions' financial reports and ECB calculations.
Note: Based on available figures for 20 IFRS-reporting large and complex banking groups in the euro area. Figures for Q1 2009 are annualised.

## Chart S86 Frequency distribution of return on shareholders' equity for large and complex banking groups in the euro area

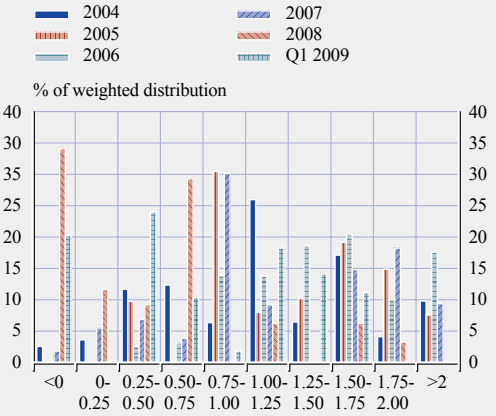
(2004 – Q1 2009; percentage)




Sources: Individual institutions' financial reports and ECB calculations.
Note: Distribution weighted by total assets. Based on available figures for 20 IFRS-reporting large and complex banking groups in the euro area. Figures for Q1 2009 are annualised.

## Chart S87 Frequency distribution of return on risk-weighted assets for large and complex banking groups in the euro area

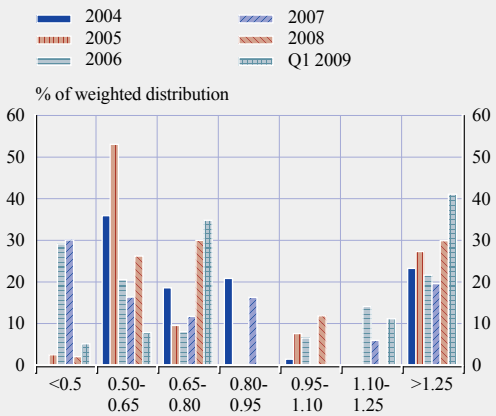
(2004 – Q1 2009; percentage)




Sources: Individual institutions' financial reports and ECB calculations.
Note: Distribution weighted by total assets. Based on available figures for 20 IFRS-reporting large and complex banking groups in the euro area. Figures for Q1 2009 are annualised.

## Chart S88 Frequency distribution of net interest income for large and complex banking groups in the euro area

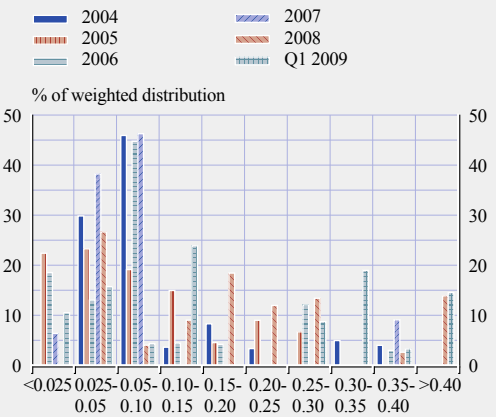
(2004 – Q1 2009; percentage of total assets)




Sources: Individual institutions' financial reports and ECB calculations.
Note: Distribution weighted by total assets. Based on available figures for 20 IFRS-reporting large and complex banking groups in the euro area. Figures for Q1 2009 are annualised.

## Chart S89 Frequency distribution of net loan impairment charges for large and complex banking groups in the euro area

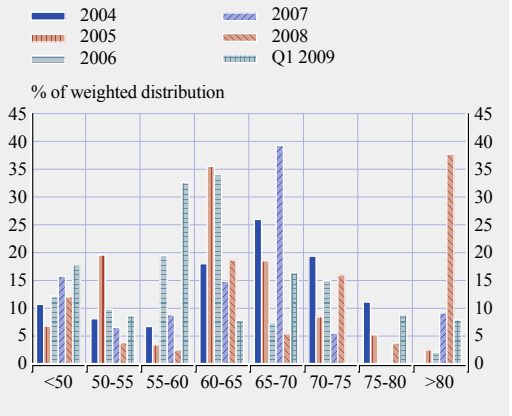
(2004 – Q1 2009; percentage of total assets)




Sources: Individual institutions' financial reports and ECB calculations.
Note: Distribution weighted by total assets. Based on available figures for 20 IFRS-reporting large and complex banking groups in the euro area. Figures for Q1 2009 are annualised.

## Chart S90 Frequency distribution of cost-to-income ratios for large and complex banking groups in the euro area

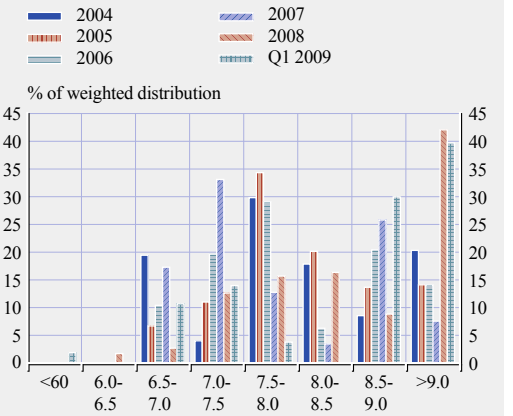
(2004 – Q1 2009; percentage)




Sources: Individual institutions' financial reports and ECB calculations.
Note: Distribution weighted by total assets. Based on available figures for 20 IFRS-reporting large and complex banking groups in the euro area.

## Chart S91 Frequency distribution of Tier 1 ratios for large and complex banking groups in the euro area

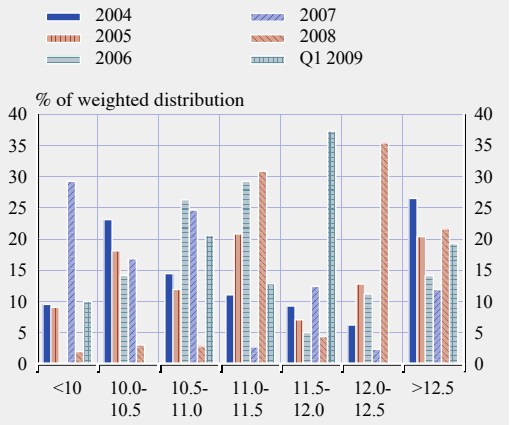
(2004 – Q1 2009; percentage)




Sources: Individual institutions' financial reports and ECB calculations.
Note: Distribution weighted by total assets. Based on available figures for 20 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

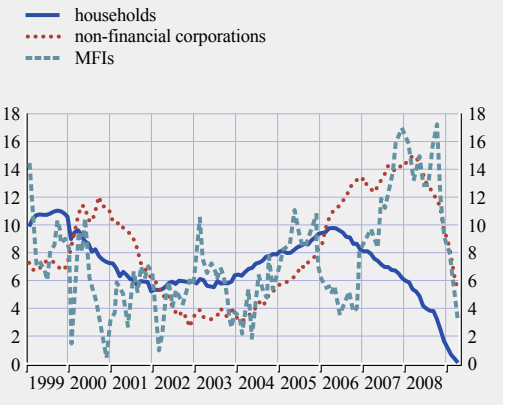
(2004 – Q1 2009; percentage)




Sources: Individual institutions' financial reports and ECB calculations.
Note: Distribution weighted by total assets. Based on available figures for 20 IFRS-reporting large and complex banking groups in the euro area.

## Chart S93 Annual growth in euro area MFI loans extended by sector

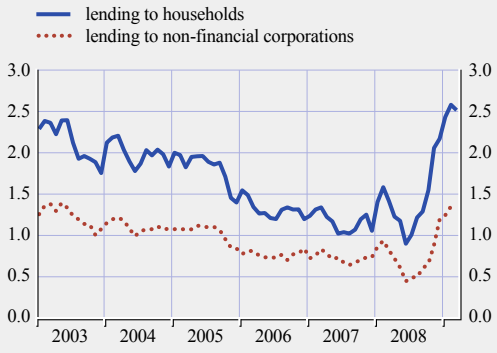
(Jan. 1999 – Apr. 2009; percentage change per annum)




Source: ECB.
Note: Data are based on financial transactions of MFI loans.

## Chart S94 Lending margins of euro area MFIs

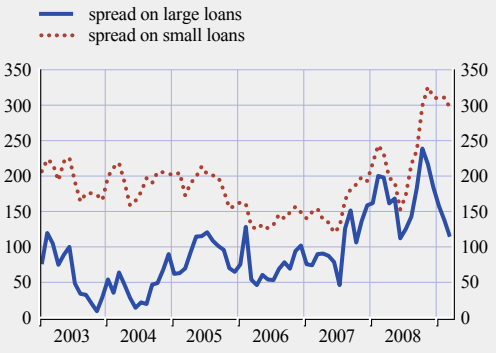
(Jan. 2003 – Mar. 2009; percentage points)




Sources: ECB, Reuters, Thomson Financial 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 rate fixations/maturities.

## Chart S95 Euro area MFI loan spreads

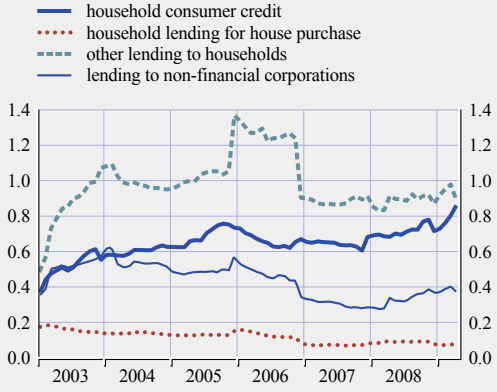
(Jan. 2003 – Mar. 2009; basis points)




Sources: ECB, Thomson Financial Datastream and ECB calculations.
Note: The spread is between the rate on loans to non-financial corporations with initial rate fixation of one to five years and the three-year government bond yield, for small (below EUR 1 million) and large (above EUR 1 million) loans respectively.

## Chart S96 Write-off rates on euro area MFI loans

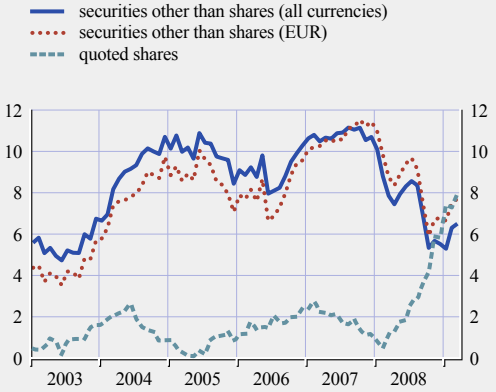
(Jan. 2003 – Apr. 2009; 12-month moving sums; percentage of the outstanding amount of loans)




Source: ECB.

## Chart S97 Annual growth in euro area MFI securities and shares issuance

(Jan. 2003 – Mar. 2009; percentage change per annum)




Source: ECB.

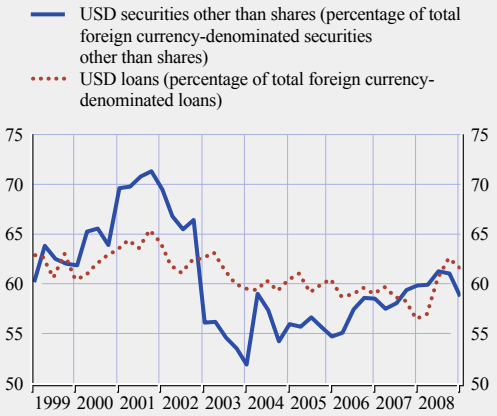
## Chart S98 Deposit margins of euro area MFIs

(Jan. 2003 – Mar. 2009; percentage points)


Sources: ECB, Reuters, Thomson Financial 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 rate fixations/maturities.

## Chart S99 Euro area MFI foreign currency-denominated assets, selected balance sheet items

(Q1 1999 – Q1 2009)




Source: ECB.

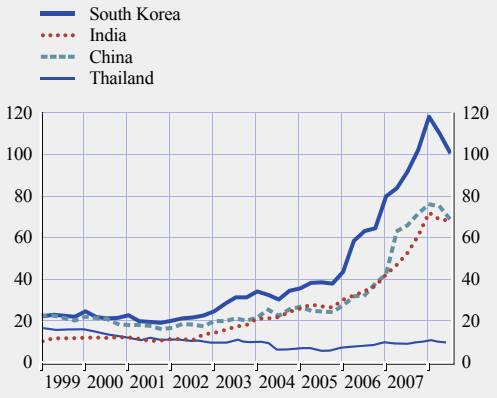
## Chart S100 Consolidated foreign claims of domestically owned euro area banks on Latin American countries

(Q1 1999 – Q3 2008; USD billions)


Sources: BIS and ECB calculations.

## Chart S101 Consolidated foreign claims of domestically owned euro area banks on Asian countries

(Q1 1999 – Q3 2008; USD billions)




Sources: BIS and ECB calculations.

## Table S6 Consolidated foreign claims of domestically owned euro area banks on individual countries

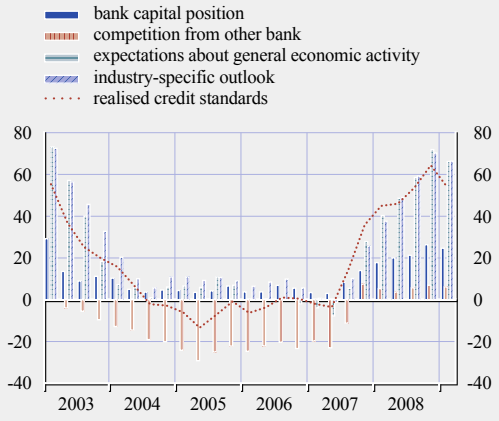
(percentage of total consolidated foreign claims)

| | 2006 | | | | 2007 | | | | 2008 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 |
| **Total non-developed countries (incl. offshore centres)** | **25.3** | **25.3** | **25.5** | **26.2** | **26.0** | **27.0** | **28.7** | **30.8** | **30.8** | **32.5** | **32.7** |
| Hong Kong | 0.8 | 0.9 | 0.9 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.7 | 0.8 |
| Singapore | 0.7 | 0.7 | 0.8 | 0.6 | 0.7 | 0.9 | 0.7 | 0.7 | 0.8 | 0.9 | 0.9 |
| **Total offshore centres** | **7.5** | **7.5** | **7.4** | **7.3** | **7.2** | **7.5** | **8.0** | **8.2** | **7.9** | **7.8** | **8.0** |
| China | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.7 | 0.8 | 0.7 | 0.8 | 0.8 |
| India | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.7 | 0.7 | 0.8 |
| Indonesia | 0.2 | 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 | 0.2 | 0.2 | 0.2 | 0.1 |
| Philippines | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| South Korea | 0.7 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.1 | 1.2 | 1.1 | 1.1 |
| Taiwan China | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.4 | 0.3 |
| Thailand | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| **Total Asia and Pacific EMEs** | **2.9** | **3.1** | **3.1** | **3.1** | **3.2** | **3.4** | **3.5** | **3.9** | **4.0** | **4.1** | **4.1** |
| Czech Republic | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.6 | 1.6 | 1.8 | 2.0 | 2.0 |
| Hungary | 1.1 | 1.1 | 1.1 | 1.1 | 1.2 | 1.2 | 1.3 | 1.4 | 1.4 | 1.5 | 1.5 |
| Poland | 1.5 | 1.5 | 1.5 | 1.6 | 1.8 | 1.9 | 2.0 | 2.2 | 2.4 | 2.7 | 2.8 |
| Russia | 1.0 | 0.9 | 0.9 | 1.0 | 1.1 | 1.2 | 1.5 | 1.6 | 1.6 | 1.8 | 1.9 |
| Turkey | 0.7 | 0.6 | 0.7 | 0.9 | 0.9 | 0.9 | 1.0 | 1.1 | 1.0 | 1.1 | 1.2 |
| **Total European EMEs and new EU Member States** | **7.5** | **7.6** | **7.9** | **8.7** | **9.1** | **9.2** | **10.1** | **11.2** | **11.4** | **12.3** | **12.7** |
| Argentina | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 |
| Brazil | 1.6 | 1.5 | 1.4 | 1.6 | 1.5 | 1.6 | 1.6 | 1.8 | 1.7 | 2.1 | 1.3 |
| Chile | 0.7 | 0.6 | 0.6 | 0.6 | 0.5 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 |
| Colombia | 0.2 | 0.1 | 0.1 | 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 | 0.0 |
| Mexico | 2.1 | 2.0 | 2.1 | 2.0 | 1.7 | 1.8 | 1.8 | 1.9 | 1.8 | 2.0 | 2.1 |
| Peru | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| Uruguay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Venezuela | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 |
| **Total Latin America** | **5.4** | **5.2** | **5.1** | **5.2** | **4.7** | **4.9** | **5.0** | **5.3** | **5.2** | **5.8** | **5.3** |
| Iran | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 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 | 0.2 | 0.2 | 0.2 | 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 | 0.2 |
| **Total Middle East and Africa** | **2.1** | **1.9** | **2.0** | **1.9** | **1.9** | **2.0** | **2.1** | **2.3** | **2.4** | **2.5** | **2.6** |

Sources: 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 Euro area banks' credit standards applied to loans and credit lines to enterprises and contributing factors

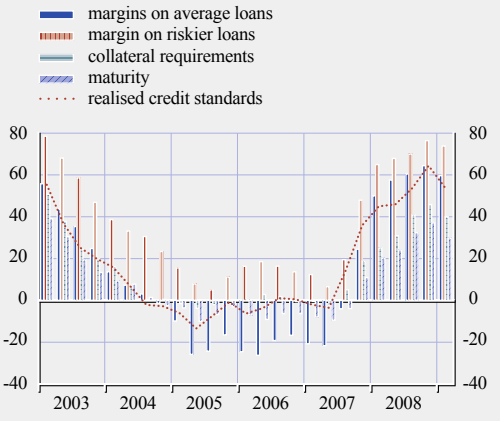
(Q1 2003 – Q1 2009; net percentage; two-quarter moving average)




Source: ECB.
Note: The net percentages refer to the difference between those banks reporting that credit standards had been tightened and that the given factors had contributed to a tightening of credit standards compared to the previous quarter and those banks reporting that they had been eased.

## Chart S103 Euro area banks' credit standards applied to loans and credit lines to enterprises and terms and conditions

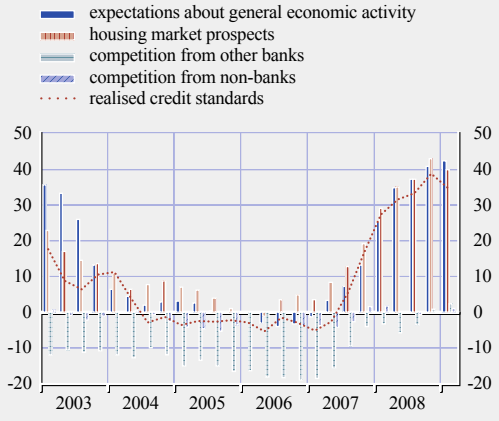
(Q1 2003 – Q1 2009; net percentage; two-quarter moving average)




Source: ECB.
Note: The net percentages refer to the difference between those banks reporting that credit standards, terms and conditions had been tightened compared to the previous quarter and those banks reporting that they had been eased.

## Chart S104 Euro area banks' credit standards applied to loans to households for house purchase and contributing factors

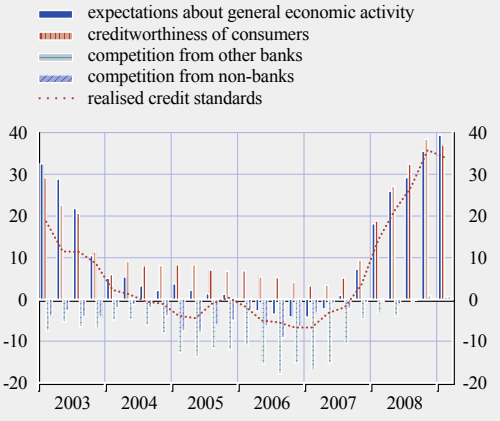
(Q1 2003 – Q1 2009; net percentage; two-quarter moving average)




Source: ECB.
Note: The net percentages refer to the difference between those banks reporting that credit standards had been tightened and that the given factors had contributed to a tightening of credit standards compared to the previous quarter and those banks reporting that they had been eased.

## Chart S105 Euro area banks' credit standards applied to consumer credit loans to households and contributing factors

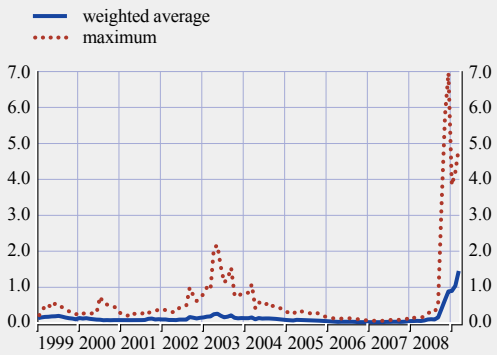
(Q1 2003 – Q1 2009; net percentage; two-quarter moving average)




Source: ECB.
Note: The net percentages refer to the difference between those banks reporting that credit standards had been tightened and that the given factors had contributed to a tightening of credit standards compared to the previous quarter and those banks reporting that they had been eased.

## Chart S106 Expected default frequencies (EDFs) for large and complex banking groups in the euro area

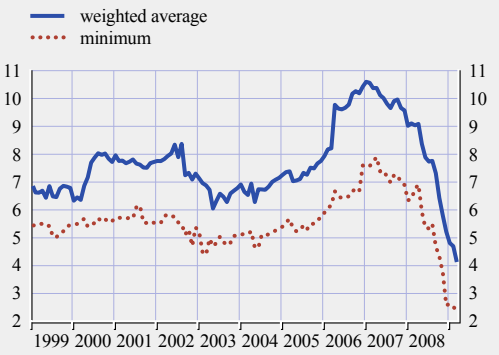
(Jan. 1999 – Mar. 2009; percentage probability)




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

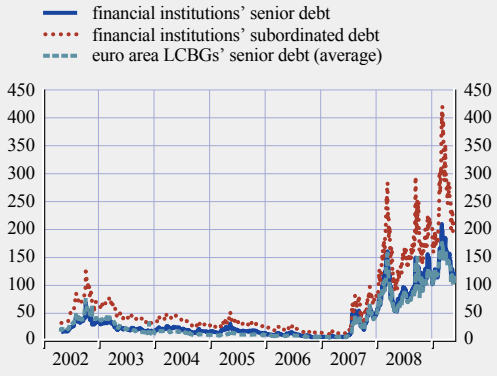
(Jan. 1999 – Mar. 2009)




Sources: Moody's KMV and ECB calculations.
Note: An increase in the distance-to-default reflects an improving assessment.

## Chart S108 European financial institutions' and euro area large and complex banking groups' credit default swap spreads

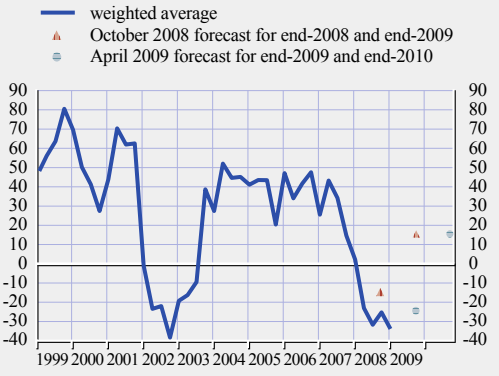
(May 2002 – May 2009; basis points; five-year maturity)




Sources: JPMorgan Chase & Co. and Bloomberg.
Note: European financial institutions and non-financial institutions correspond to the definitions of JPMorgan Chase & Co.

## Chart S109 Earnings and earnings forecasts for large and complex banking groups in the euro area

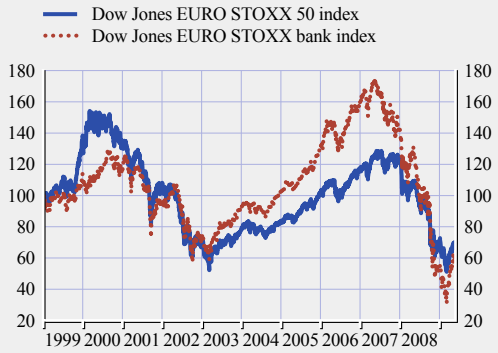
(Q1 1999 – Q4 2010; percentage change per annum; weighted average)




Sources: Thomson Financial Datastream, I/B/E/S and ECB calculations.
Note: Derived from earnings per share (EPS) adjusted for number of shares outstanding.

## Chart S110 Dow Jones EURO STOXX total market and bank indices

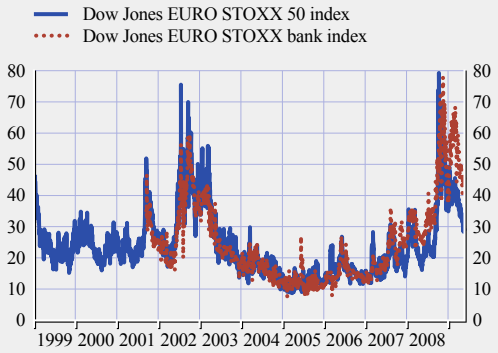
(Jan. 1999 – May 2009; index: Jan. 1999 = 100)




Source: Bloomberg.

## Chart S111 Implied volatility for Dow Jones EURO STOXX total market and bank indices

(Jan. 1999 – May 2009; percentage)




Source: Bloomberg.

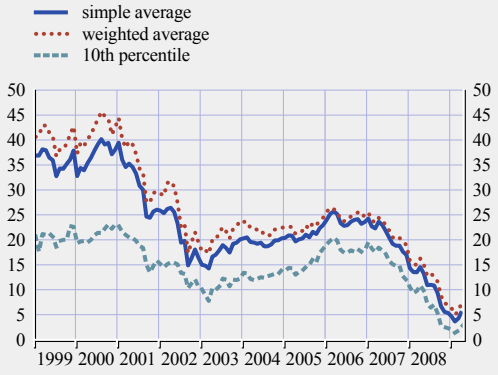
## Chart S112 Risk reversal and strangle of the Dow Jones EURO STOXX bank index

(Feb. 2003 – May 2009; percentage; implied volatility; 20-day moving average)


Sources: Bloomberg and ECB calculations.
Note: 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 average 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

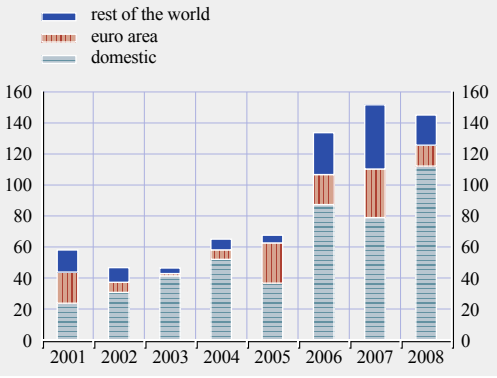
(Jan. 1999 – Apr. 2009; ten-year trailing earnings)




Sources: Thomson Financial 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 S114 Value of mergers and acquisitions by euro area banks

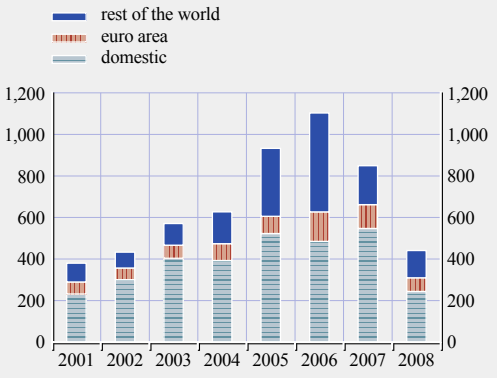
(2001 – 2008; EUR billions)




Sources: Bureau van Dijk (ZEPHYR database) and ECB calculations.
Note: All completed mergers and acquisitions (including also institutional buyouts, joint ventures, management buyouts/ins, demergers, minority stakes and share buybacks) where a bank is the acquirer.

## Chart S115 Number of mergers and acquisitions by euro area banks

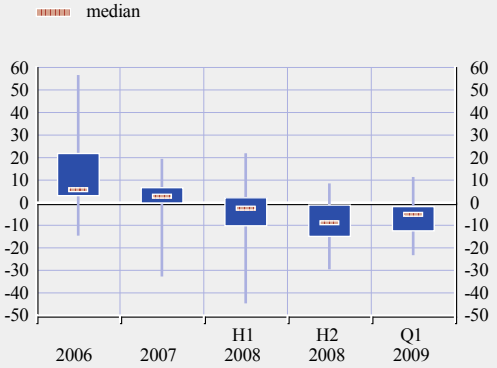
(2001 – 2008; total number of transactions)




Sources: Bureau van Dijk (ZEPHYR database) and ECB calculations.
Note: All completed mergers and acquisitions (including also institutional buyouts, joint ventures, management buyouts/ins, demergers, minority stakes and share buybacks) where a bank is the acquirer.

## Chart S116 Distribution of gross-premium-written growth for a sample of large euro area primary insurers

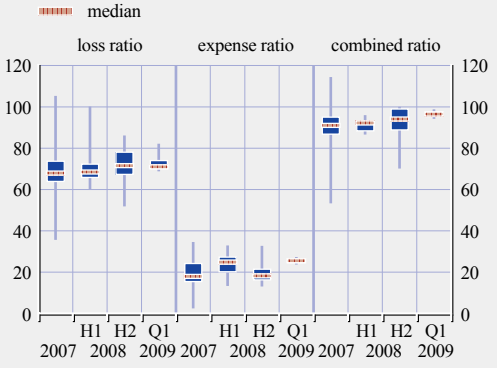
(2006 – Q1 2009; percentage change per annum; nominal values; maximum, minimum, interquartile distribution)




Sources: Bloomberg, individual institutions' financial report and ECB calculations.
Note: Based on available figures for 20 large euro area insurers.

## Chart S117 Distribution of loss, expense and combined ratios in non-life business for a sample of large euro area primary insurers

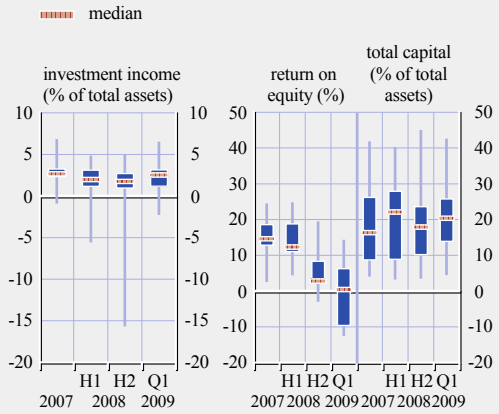
(2007 – Q1 2009; percentage of premiums earned; maximum, minimum, interquartile distribution)




Sources: Bloomberg, individual institutions' financial report and ECB calculations.
Note: Based on available figures for 20 large euro area insurers.

## Chart S118 Distribution of investment income, profitability and solvency for a sample of large euro area primary insurers

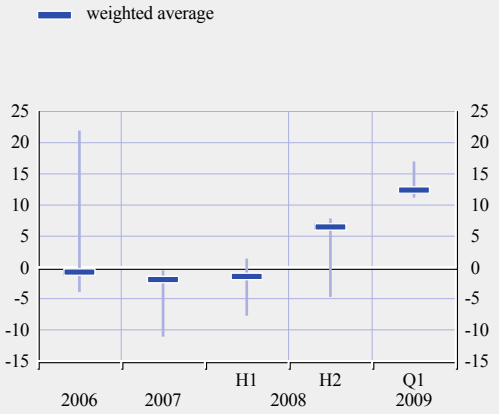
(2007 – Q1 2009; maximum, minimum, interquartile distribution)




Sources: Bloomberg, individual institutions' financial report and ECB calculations.
Note: Based on available figures for 20 large euro area insurers.

## Chart S119 Distribution of gross-premium-written growth for a sample of large euro area reinsurers

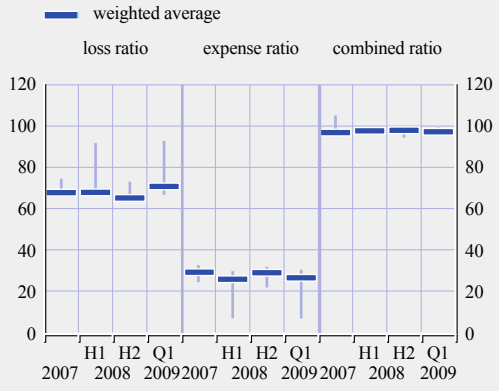
(2006 – Q1 2009; percentage change per annum; maximum-minimum distribution)




Sources: Bloomberg, individual institutions' financial report and ECB calculations.
Note: Based on available figures for four large euro area reinsurers.

## Chart S120 Distribution of loss, expense and combined ratios for a sample of large euro area reinsurers

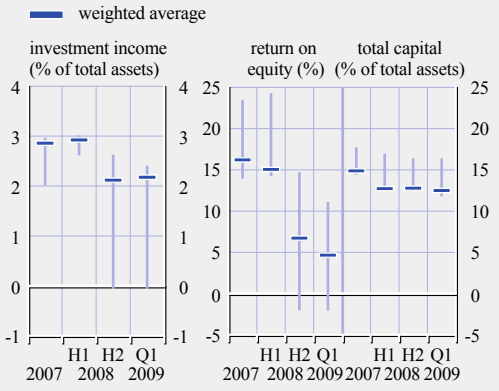
(2007 – Q1 2009; percentage of premiums earned; maximum-minimum distribution)




Sources: Bloomberg, individual institutions' financial report and ECB calculations.
Note: Based on available figures for four large euro area reinsurers.

## Chart S121 Distribution of investment income, profitability and solvency for a sample of large euro area reinsurers

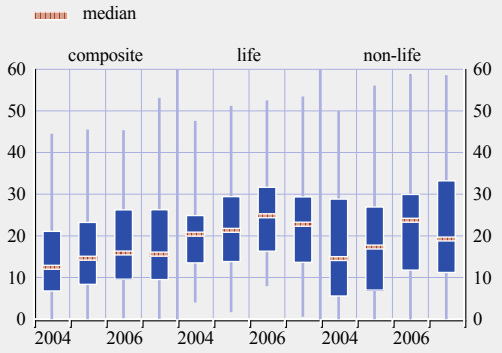
(2007 – Q1 2009; maximum-minimum distribution)




Sources: Bloomberg, individual institutions' financial report and ECB calculations.
Note: Based on available figures for four large euro area reinsurers.

## Chart S122 Distribution of equity asset shares of euro area insurers

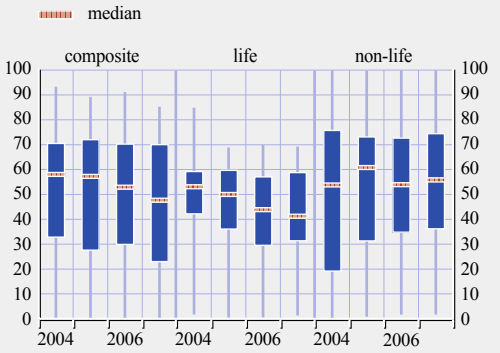
(2004 – 2007; percentage of total investments; maximum, minimum, interquartile distribution)




Source: Standard and Poor's (Eurothesys database).

## Chart S123 Distribution of bond asset shares of euro area insurers

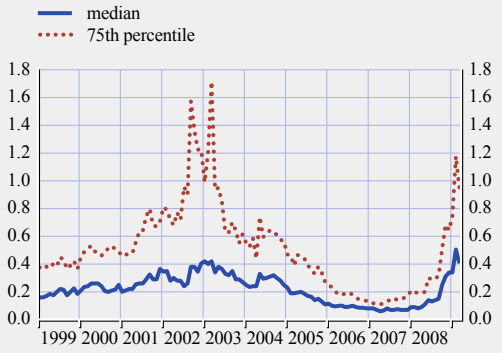
(2004 – 2007; percentage of total investments; maximum, minimum, interquartile distribution)




Source: Standard and Poor's (Eurothesys database).

## Chart S124 Expected default frequencies (EDFs) for the euro area insurance sector

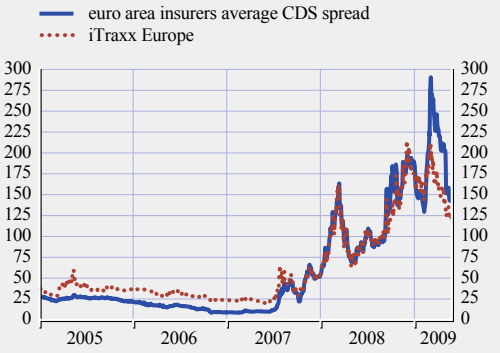
(Jan. 1999 – Mar. 2009; percentage probability)




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 S125 Credit default swap spreads for a sample of large euro area insurers and the iTraxx Europe main index

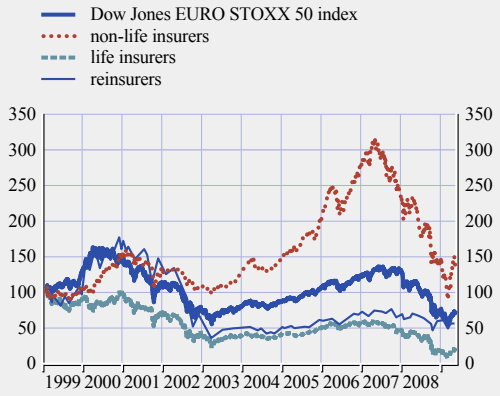
(Jan. 2005 – May 2009; basis points; five-year maturity)




Sources: Bloomberg and JPMorgan Chase & Co.

## Chart S126 Dow Jones EURO STOXX total market and insurance indices

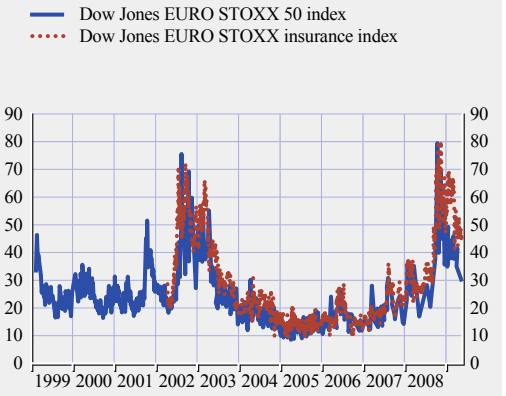
(Jan. 1999 – May 2009; index: Jan. 1999 = 100)




Source: Thomson Financial Datastream.

## Chart S127 Implied volatility for Dow Jones EURO STOXX total market and insurance indices

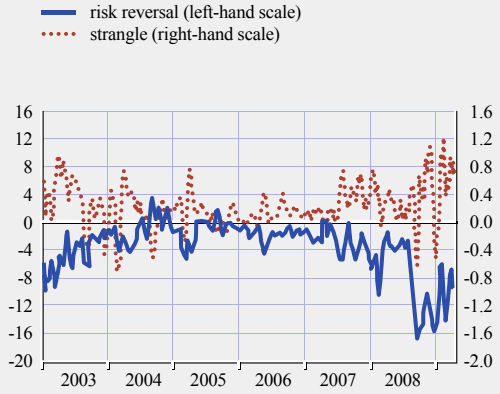
(Jan. 1999 – May 2009; percentage)




Source: Bloomberg.

## Chart S128 Risk reversal and strangle of the Dow Jones EURO STOXX insurance index

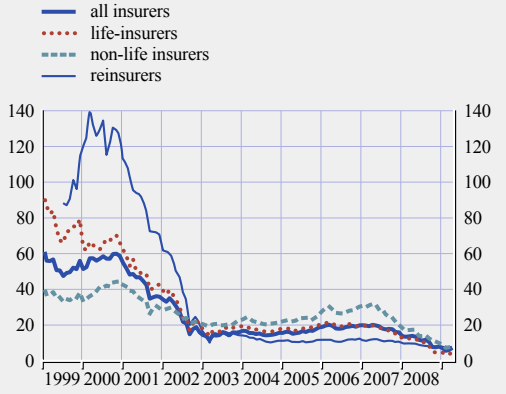
(Jan. 2003 – May 2009; percentage; implied volatility; 20-day moving average)




Sources: Bloomberg and ECB calculations.
Note: 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 average at-the-money volatility of calls and puts with 50 delta.

## Chart S129 Price-earnings (P/E) ratios for euro area insurers

(Jan. 1999 – Apr. 2009; ten-year trailing earnings)

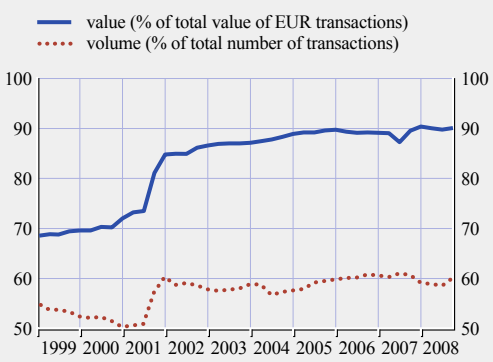



Sources: Thomson Financial Datastream and ECB calculations.
Note: The P/E ratio is based on prevailing stock prices relative to an average of the previous ten years of earnings.

# 6 EURO AREA FINANCIAL SYSTEM INFRASTRUCTURES

## Chart S130 Large-value payments processed via TARGET

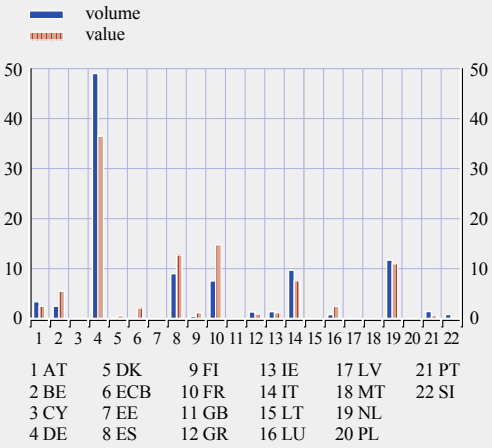
(Q1 1999 – Q4 2008)




Source: ECB.

## Chart S131 Large-value payments processed via TARGET, by country

(Q4 2008; percentage of the NCB/ECB shares in terms of value and volume)




Source: ECB.
Note: As of 1 January 2007 Sveriges Riksbank does no longer particpate in TARGET.

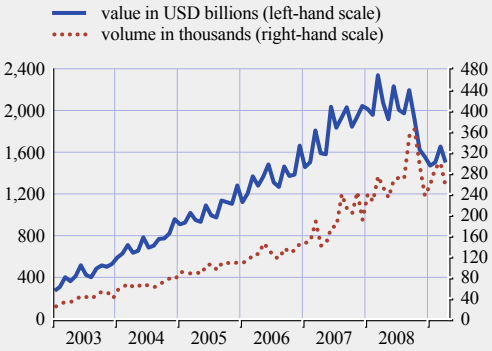
## Chart S132 TARGET availability

(Jan. 1999 – Apr. 2009; percentage; three-month moving average)


Source: ECB.

## Chart S133 Volumes and values of foreign exchange trades settled via Continuous Linked Settlement (CLS)

(Jan. 2003 – Apr. 2009)




Source: ECB.

ISSN 1830-2017