



EUROPEAN CENTRAL BANK

EUROSYSTEM

FINANCIAL STABILITY REVIEW JUNE 2008

# FINANCIAL STABILITY REVIEW

JUNE 2008

ECB EZB EKT EKP

10

## EMBARGO

This report is free for publication from 5 p.m. (CET) on Monday, 9 June 2008.

No data from the report may be released before the above embargo has expired.

Any publication that breaks the embargo will cease to receive texts in advance of the release time.



EUROPEAN CENTRAL BANK  
THE FIRST TEN YEARS

EUROPEAN CENTRAL BANK



EUROPEAN CENTRAL BANK

EUROSYSTEM



## FINANCIAL STABILITY REVIEW

JUNE 2008

In 2008 all ECB publications feature a motif taken from the €10 banknote.

© European Central Bank, 2008

**Address**

Kaiserstrasse 29  
60311 Frankfurt am Main  
Germany

**Postal address**

Postfach 16 03 19  
60066 Frankfurt am Main  
Germany

**Telephone**

+49 69 1344 0

**Website**

<http://www.ecb.europa.eu>

**Fax**

+49 69 1344 6000

*All rights reserved. Reproduction for educational and non-commercial purposes is permitted provided that the source is acknowledged.*

*Unless otherwise stated, this document uses data available as at 8 May 2008.*

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



# CONTENTS

<b>PREFACE</b>	<b>9</b>	<b>IV SPECIAL FEATURES</b>	<b>143</b>
<b>I OVERVIEW</b>	<b>11</b>	<b>A SECURITISATION, BANK RISK-TAKING AND LOAN SUPPLY IN THE EURO AREA</b>	<b>143</b>
<b>II THE MACRO-FINANCIAL ENVIRONMENT</b>	<b>19</b>	<b>B WHAT EQUITY, CREDIT AND CREDIT DEFAULT SWAP MARKETS TELL US ABOUT THE RISK PROFILE OF BANKS</b>	<b>147</b>
<b>I THE EXTERNAL ENVIRONMENT</b>	<b>19</b>	<b>C HOW HAS CDO MARKET PRICING CHANGED DURING THE TURMOIL? EVIDENCE FROM CDS INDEX TRANCHES</b>	<b>154</b>
1.1 Risks and financial imbalances in the external environment	19		
1.2 Key developments in international financial markets	28		
1.3 Conditions of global financial institutions	40		
<b>2 THE EURO AREA ENVIRONMENT</b>	<b>57</b>	<b>GLOSSARY</b>	<b>163</b>
2.1 Economic outlook and risks	57	<b>STATISTICAL ANNEX</b>	<b>SI</b>
2.2 Balance sheet condition of non-financial corporations	60	<b>BOXES</b>	
2.3 Commercial property markets	69	1 US mortgage markets, mortgage resets scheduled in 2008, and the recent Fed interest rate cuts	25
2.4 Balance sheet condition of the household sector	72	2 The role of structured markets in propagating the initial sub-prime shock	32
<b>III THE EURO AREA FINANCIAL SYSTEM</b>	<b>77</b>	3 Recent developments in Chinese equity markets	36
<b>3 EURO AREA FINANCIAL MARKETS</b>	<b>77</b>	4 “Monoline” financial guarantors: the business model and linkages with financial institutions and capital markets	47
3.1 Key developments in the money market	77	5 The macroeconomic environment and financial stability: evidence from past banking crises	58
3.2 Key developments in capital markets	86	6 How vulnerable are euro area and US firms to further tensions in credit markets?	63
<b>4 THE EURO AREA BANKING SECTOR</b>	<b>93</b>	7 Is the corporate bank lending cycle turning?	67
4.1 Financial condition of large and complex banking groups	93	8 Year-end and quarter-end effects on money markets	78
4.2 Banking sector outlook and risks	98	9 Eurosystem standing facilities and financial stability	80
4.3 Outlook for the banking sector on the basis of market indicators	117	10 Evidence on liquidity and credit risk from deposit-OIS spreads	82
4.4 Overall assessment	121		
<b>5 OTHER EURO AREA FINANCIAL INSTITUTIONS</b>	<b>123</b>		
5.1 The euro area insurance sector	123		
<b>6 STRENGTHENING FINANCIAL SYSTEM INFRASTRUCTURES</b>	<b>135</b>		
6.1 Payment infrastructures and infrastructure services	135		

11	Financial stability implications of the drying-up of securitised commercial mortgage markets	88	1.16	Implied volatility in the US government bond market	30
12	Mark-to-market accounting and the loss figures produced by large and complex banking groups	95	1.17	Value index of CDSs on asset-backed US sub-prime non-agency securities (ABX indices)	31
13	Initiatives and measures that are being taken in order to restore confidence and strengthen financial system resilience	99	1.18	Spreads on various asset-backed securities and synthetic collateralised debt obligations (CDOs)	31
14	Leveraged loan exposures and mark-to-market write-down risks of euro area large and complex banking groups	104	1.19	Securitisation volumes in the United States by type of collateral	31
15	Analysing the topology of the EU cross-border banking flows network	108	1.20	Implied volatility in US equity markets	34
16	Stress testing: a fundamental tool for financial risk measurement	116	1.21	Emerging market economy sovereign bond spreads	34
17	What are euro area reinsurers insuring and where?	129	1.22	Recent evolution of the MSCI and S&P 500 equity indices	35
			1.23	Assets under management of dedicated emerging market economy funds	35
<b>CHARTS</b>					
1.1	The US current account deficit and its counterparts	19	1.24	Implied and realised volatility of the EUR/USD and JPY/USD nominal bilateral exchange rates	38
1.2	Net capital flows to the United States	19	1.25	Changes in the bilateral exchange rate of the euro vis-à-vis selected groups of currencies and periods	38
1.3	US corporate sector profits	21	1.26	Differential between implied and realised volatilities of swap rates for different currencies and currency options	39
1.4	US non-financial corporate sector: net funds raised in markets	21	1.27	Risk reversals and butterfly spreads for the EUR/USD and the JPY/USD exchange rates	39
1.5	US banks' credit standards on loans to firms	22	1.28	Speculative positions on oil futures and oil prices	39
1.6	US house price inflation	23	1.29	Option-implied risk-neutral densities of oil prices	40
1.7	Mortgage equity withdrawal in the United States	23	1.30	Price of gold and amounts in exchange-traded funds (ETFs)	40
1.8	Personal bankruptcy filings in the United States	23	1.31	Return on equity for global large and complex banking groups	41
1.9	Charge-offs and delinquencies on consumer loans in the United States	24	1.32	Fee and commission revenues and trading revenues for global large and complex banking groups	42
1.10	US banks' credit standards on mortgages to individuals	24	1.33	Change in value-at-risk levels as a percentage of shareholders' equity for global large and complex banking groups	42
1.11	Credit to the private sector in non-euro area EU countries	27			
1.12	Capital inflows into emerging economies from dedicated emerging market economy funds	28			
1.13	Three-month LIBOR-overnight indexed swap (OIS) spread	29			
1.14	Total amounts of commercial paper outstanding in the United States	29			
1.15	Liquidity premium in the US government bond market	30			

1.34	Change in return on equity and capital measures for global large and complex banking groups	43	2.6	Euro area issuance activities and corporate bond yields for the high yield segment	63
1.35	Credit default swap spreads for global large and complex banking groups	44	2.7	MFI loans to non-financial corporations and syndicated lending	66
1.36	Equity prices of Fannie Mae and Freddie Mac	44	2.8	EONIA swap rate, three-month EURIBOR and short-term lending rates to non-financial corporations	66
1.37	Net income of Ambac and MBIA	46	2.9	Long-term bond yields, bank bond yields and long-term bank rate for loans to non-financial corporations	67
1.38	Credit default swap (CDS) spreads and stock prices for Ambac and MBIA	46	2.10	Euro area country distributions of total returns on commercial property	69
1.39	Global hedge fund returns	49	2.11	Growth in direct commercial property investment volumes in the euro area	69
1.40	Distribution of historical global hedge fund returns by investment holding period	50	2.12	Euro area commercial property company share prices and the Dow Jones EURO STOXX 50 index	71
1.41	Co-investment of personal capital by hedge fund managers	50	2.13	Cumulative changes in euro area commercial property company share prices relative to the Dow Jones EURO STOXX 50 index	71
1.42	Medians of pairwise correlation coefficients of monthly hedge fund returns within strategies	51	2.14	Loans for house purchase and house prices in the euro area	72
1.43	Hedge fund leverage	52	2.15	Household sector net worth in the euro area	73
1.44	Hedge fund returns and changes in leverage and gross assets	52	2.16	Euro area households' financial situation and unemployment expectations	74
1.45	Hedge fund aggregate quarterly net redemptions and net investments by strategy	53	3.1	Financial market liquidity indicator for the euro area and its components	77
1.46	Global hedge fund launch, liquidation and attrition rates	54	3.2	Spreads between EURIBOR and EONIA swap rates	81
1.47	Distribution of hedge fund drawdowns	54	3.3	Total amounts outstanding in the euro commercial paper (ECP) market	85
1.48	Seasonality of global hedge fund launch, liquidation and attrition rates	55	3.4	Intra-euro area yield spreads on ten-year government bonds	86
2.1	Forecasts for euro area GDP growth in 2008	57	3.5	Conditional correlation between daily euro area bond and stock returns	86
2.2	Annual earnings growth of euro area non-financial corporations and recession periods in the United States and the euro area	61	3.6	Financial and non-financial corporate bond spreads in the euro area	87
2.3	Euro area firms' income generated within and outside Europe	61	3.7	iTraxx main and senior financials indices	87
2.4	Costs, sales and profits for large listed non-financial firms in the euro area	62			
2.5	Earnings per share (EPS) growth in the euro area for financial and non-financial corporations: actual and expected	62			

3.8	Relationship between the Dow Jones EURO STOXX and the iTraxx main index	88	4.11	Distribution of euro area large and complex banking groups' loan exposures to households	101
3.9	Relationship between the implied volatility of the Dow Jones EURO STOXX and the iTraxx main index	88	4.12	Euro area large and complex banking groups' exposure to sub-investment grade corporate loans	103
3.10	Price-earnings (P/E) ratios for AAA-rated euro area financial and non-financial companies	91	4.13	Geographical concentration of loans extended by euro area LCBGs to sub-investment grade corporates between 2005 and 2008	103
3.11	Dispersion of price-earnings (P/E) ratios across sectors in the euro area	92	4.14	Customer funding gap of large and complex banking groups in the euro area	106
3.12	Net inflows into European equity funds	92	4.15	Euro area banks' loan securitisation issuance per country of collateral	107
4.1	Return on equity of listed large and complex banking groups in the euro area	93	4.16	Net issuance of debt securities by euro area MFIs by maturity	110
4.2	Impact of the turbulence on full-year 2007 net income of large and complex banking groups in the euro area	94	4.17	Share of short-term non-deposit liabilities for large and complex banking groups in the euro area	110
4.3	Frequency distribution of return on equity of large and complex banking groups in the euro area	94	4.18	Distribution of interest rate value at risk (VaR) for large and complex banking groups in the euro area	111
4.4	Frequency distribution of return on risk-weighted assets for large and complex banking groups in the euro area	94	4.19	Term-structure curves of euro area interest rates	111
4.5	Trading revenue as a percentage of Tier 1 capital for large and complex banking groups in the euro area	97	4.20	Exchange rate value at risk (VaR) for large and complex banking groups in the euro area	112
4.6	Frequency distribution of net loan impairment charges for large and complex banking groups in the euro area	97	4.21	Equity market value at risk (VaR) for large and complex banking groups in the euro area	112
4.7	Frequency distribution of cost-to-income ratios for large and complex banking groups in the euro area	98	4.22	Distribution of global hedge fund returns	113
4.8	Frequency distribution of Tier 1 ratios for large and complex banking groups in the euro area	98	4.23	Typical valuation haircuts or initial margins	113
4.9	Earnings and earnings forecasts for large and complex banking groups in the euro area	101	4.24	Estimated total net asset value (NAV) and proportion of hedge funds breaching triggers of total NAV cumulative decline	114
4.10	Distribution of euro area large and complex banking groups' retained earnings	101	4.25	Variance of euro area banks' equity returns explained by common and financial sector factors	117
			4.26	Implied probabilities of two or more euro area large and complex banking group defaults	118

4.27	Option-implied risk-neutral density bands for the Dow Jones EURO STOXX bank index	119
4.28	Rating actions for large and complex banking groups in the euro area	120
4.29	Turbulence-related loss in 2007 after-tax net income reported by large and complex banking groups	121
5.1	Distribution of gross-premium-written growth for a sample of large euro area insurers	123
5.2	Distribution of income, profitability and solvency for a sample of large euro area insurers	124
5.3	Profit and loss write-downs of selected euro area primary insurers and reinsurers	124
5.4	Distribution of gross-premium-written growth for a sample of large euro area reinsurers	125
5.5	Distribution of income, profitability and solvency for a sample of large euro area reinsurers	125
5.6	Insured losses from natural catastrophes and man-made disasters	125
5.7	Credit exposures of selected euro area primary insurers and reinsurers	127
5.8	Potential deviations from insurers' mortality assumptions	128
5.9	Investors in natural catastrophe insurance-linked securities	131
5.10	Share price developments for euro area banks and insurers relative to the Dow Jones EURO STOXX 50 index	132
5.11	Dow Jones EURO STOXX total market and insurance indices	132

**TABLES**

1.1	Recent investments by sovereign wealth funds in the financial services industry	20
5.1	Number of Atlantic hurricanes and storms recorded and forecasts for the 2008 season	128





## 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

Disclosures of full-year 2007 financial results suggest that mature economy banking systems have so far been the hardest hit by the virtually unprecedented market turmoil that was unleashed by surging delinquencies on US sub-prime mortgages. In nominal euro terms, the collective asset valuation write-downs have rivalled, and may soon exceed, the costs of several well-known episodes of severe industrial economy banking sector stress over the past several decades. Valuation losses on assets with sub-prime exposure, often embedding significant leverage, have considerably amplified the underlying credit losses that will be largely borne by US commercial banks. The disclosures have also plainly illustrated that the explosive growth over the past decade of credit derivatives markets had not been as effective as once thought in transferring credit risk off the balance sheets of commercial banks. In fact, much of the risks thought to have been transferred actually remained within the global banking system and was merely redistributed within and between national banking systems. While such risk redistribution within banking systems has the capacity to enhance financial system stability by reducing risk concentrations and improving diversification, in practice banks which had transferred risks off their balance sheets later had to acknowledge that they were still bearing the associated credit risk.

Stresses on the euro area and other mature economy financial systems have persisted longer than had been anticipated. They became deeper, broader and more drawn-out for several reasons. Notably, the initial liquidity stresses encountered in the early phases of the turmoil began to give way to more fundamental concerns about creditworthiness and the capital positions of several key financial firms. In addition, banks became increasingly mindful of the importance of carefully managing their funding liquidity risks in a highly uncertain operating environment.

Six months ago, there had been optimism that the extent of the size and spread of the costs of the turmoil across financial systems would

be largely known once audited full-year 2007 financial statements had been published. In the event, the asset valuation write-downs disclosed by many financial institutions went far beyond the expectations that had prevailed in early November. Under the IFRS accounting rules, mark-to-market valuation losses on mortgage-backed securities and structured credit instruments such as collateralised debt obligations (CDOs) are, with some exceptions, taken directly through the profit and loss (P&L) account. Because many global large and complex banking groups (LCBGs) faced into the turmoil with very strong profitability, the write-downs disclosed so far have mainly impacted on profitability performances rather than the capital positions of the affected institutions. However, there were instances of losses of sufficient severity that capital buffers were materially eroded so that external capital needed to be raised to replenish these buffers. While many global LCBGs succeeded in raising fresh equity capital from a variety of investors, including sovereign wealth funds, these capital injections only covered around half of the reported losses. Furthermore, after the disclosure of full-year 2007 financial statements, expectations remained that more write-downs – including from exposures to troubled financial guarantors or so-called monoline insurers – would be revealed over the following few quarters.

Given the shortfall of capital infusions into some global LCBGs when compared to the sub-prime-related losses they had endured, uncertainties began to grow in early 2008 that the adjustment process could prove relatively protracted, involving substantial deleveraging – including by commercial banks – to the point that the supply of credit in the economy might be adversely affected at a time when the risks of a turn in the broader credit cycle appeared to have increased. In this vein, the sub-prime-related turmoil has acted as a catalyst for a broader, and in many instances necessary, reappraisal and repricing of risk. While this has posed a challenging test for the risk management and shock-absorption



capacities of key financial institutions, the adjustment should ultimately contribute positively to financial stability to the extent that it leads to a correction of imbalances and asset price misalignments, as well as by fostering better risk management. Indeed, greater risk awareness has been reflected *inter alia* in surveys of terms and conditions being set by bank loan officers in several economies which have indicated a significant tightening of lending standards beyond the sectors that had been most directly affected by the turmoil. This was particularly the case in the United States where LCBGs were the hardest hit and where the tightening of credit availability contributed to a significant deterioration in the US economic outlook. At the same time, market intelligence has indicated that significant deleveraging by investment banks and prime brokers got underway, reflected for instance in greater prudence in collateralised lending to hedge funds.

Concerns about the liquidity and general financial conditions of euro area LCBGs were felt most in the unsecured money market. After the finalisation of the December 2007 FSR, the approach of the year-end, a time when banks typically shore up their balance sheets, was greeted with considerable anxiety by euro area money market participants. In particular, there was greater precautionary demand for liquidity and, at the same time, market participants grew increasingly fearful that their counterparties could be facing significant losses on sub-prime-related securities. In order to safeguard against heightened funding liquidity risk, a renewed wave of liquidity hoarding pushed interbank rates higher. With a view to easing year-end tensions, the ECB announced that it would counter re-emerging tensions by providing ample liquidity in its weekly operations. This had the effect of immediately reducing the EONIA rate. Unsecured deposit, EONIA swap and repo rates with maturities of up to one month also fell as a consequence. Several central banks, including the ECB and the Swiss National Bank (SNB), also announced extraordinary

joint operational measures to deal with year-end concerns. This included activation of a term auction facility (TAF) by the Federal Reserve. In connection with the TAF, the Eurosystem conducted US dollar liquidity-providing operations with the US dollars being provided by the Federal Reserve by means of a temporary reciprocal currency arrangement or swap line. In the event, there was no major incident and tensions subsequently eased.

However, the easing of money market tensions proved short-lived and the market went through a new wave of strain in advance of the end of the first quarter of the year. While heightened uncertainty about banks' financial results and the potential for further write-downs were the main factors underpinning this, seasonal factors – related to anticipation of balance sheet window-dressing in advance of disclosure of first quarter financial results – and the coincident approach of the end of the Japanese financial year amplified the strains. In response, the Federal Reserve announced a range of initiatives. At the same time, the swap line with the Eurosystem was re-activated. The impact of these measures was muted, however, by rumours about the liquidity positions of some large US securities firms, and events which led the Federal Reserve to offer emergency funding to a large investment bank. In this period, term money market spreads reached record levels in the euro and other major money markets, but very short maturity spreads remained largely unaffected. Although it is challenging to disentangle the relative proportions of money market risk premia explained by liquidity and counterparty risk factors, it seemed that the latter explanation became increasingly important in the months between the finalisation of the December 2007 FSR and mid-March. After that, an easing of counterparty credit risk worries became evident across a wide range of market indicators but very high premia for liquidity risk still remained in money market interest rates.

Against the background of this further propagation of financial system stresses, the

rest of this section examines the sources of risk and vulnerability that will be key in shaping the euro area financial system stability outlook over the next six to twelve months. It first discusses those in the macro-financial environment, and this is followed by a discussion of those that are particular to the financial system. The section concludes with an overall assessment of the euro area financial stability outlook.

### SOURCES OF RISK AND VULNERABILITY IN THE MACRO-FINANCIAL ENVIRONMENT

In assessing the financial stability outlook, it is important to recall that a key triggering factor behind the recent global financial market turmoil was a relatively abrupt deterioration in US housing market conditions. The first signs of weakening surfaced when delinquency rates – harbingers of future foreclosure rates – on sub-prime adjustable-rate mortgages (ARMs) began to rise after mid-2005. The deterioration was later intensified when house prices started to fall from mid-2006, pushing loan-to-value ratios higher. History has shown this ratio to be the single-best predictor of US mortgage holders' decision to default and, true to form, as homeowners' equity started declining, delinquency rates on sub-prime mortgages surged from mid-2006 onwards. They also began rising on prime mortgages, albeit remaining at much lower levels. Looking ahead, crucial for the financial stability outlook will be the future trajectory of US house prices. This is because implicit in the write-downs so far absorbed by financial institutions in mature economies on asset-backed securities and structured credit products are market expectations of the ultimate amount of credit losses that will be incurred on the underlying mortgages. The final cost will depend on the eventual default rates and the loss-given-default rates – that is, the net losses that would be incurred by mortgage lenders after forced sales of the underlying housing collateral – both of which are dependent on house price dynamics.

High uncertainty surrounding the likely peak-to-trough cumulative decline in US house

prices has been reflected in a very wide range of published estimates of the total losses that financial systems will eventually have to absorb as a result of the turmoil. At one extreme, market-based estimates, whether centred on valuation changes on indices of residential mortgage-backed securities or on the market capitalisation of large financial firms known to have mortgage exposure, price in the most pessimistic scenarios for default rates and, by extension, house prices. Indeed, taking expected ultimate losses into account and depending on the assumptions made regarding default rates, market-based estimates could even imply loss-given-default rates nearing 100%. This contrasts with the outlook implied in futures prices for US houses which at the time of writing were factoring in a peak-to-trough decline of closer to 30%. Regardless of the diversity of perceived probable outcomes, there is fairly broad consensus that US house prices have further to fall before housing market conditions stabilise.

The factors likely to weigh on US house prices in the period ahead include an overhang of unsold homes near to its highest level in decades. This supply-demand imbalance could deteriorate further in the course of 2008 with around two-fifths of the outstanding stock of sub-prime ARMs scheduled to reset to higher interest rates during the year. Moreover, the credit quality of these mortgages is known to be inferior to the ARMs that reset in 2007. Even though seven interest rate cuts by the Federal Reserve have lowered the rate to which these mortgages will reset, repayment burdens are nevertheless expected to rise, thereby imposing financial stress on many households. At the same time, with very tight credit conditions prevailing in the US mortgage markets, sub-prime borrowers will not be able to avoid resets by refinancing their mortgages. Hence, delinquencies and foreclosures are likely to rise in the period ahead. As foreclosed homes are often auctioned off at substantial discounts, this is likely to depress house prices even further and raise the credit losses facing the lenders. That said, it is important to recognise that the affected securities have already

priced in a rather severe scenario for house prices, and financial firms have by now taken much of the implied losses through their income statements.

Another key source of unease about the financial stability outlook has centred on the capacity of the stresses on the US household sector and the financial system to broaden by amplifying deterioration in the corporate credit cycle. In this vein, by early May 2008, there were indications that conditions in commercial real estate markets on both sides of the Atlantic were weakening. In particular, after the finalisation of the December 2007 FSR, there were signs that commercial property companies were facing increased income and funding costs. Moreover, banks were indicating that they were tightening their standards on lending to firms more generally. The assessment is that the balance sheet conditions of firms are generally considerably stronger than they were just before the last credit cycle downturn. However, there are fears that default rates have been held artificially low over the past couple of years by an abundance of liquidity in markets for asset-backed securities, easy credit conditions and very low spreads on high-yield bonds. With the originate-to-distribute business model of banks significantly impaired by the ongoing turmoil and the risk repricing that has taken place over the past year, financing conditions facing firms have become much more challenging. With a fat tail of highly leveraged firms with very low profitability which are expected to face much higher refinancing costs than before, rating agencies are expecting a surge of defaults by both US and euro area speculative-grade firms in the near term. An additional source of anxiety for the probability of default of euro area firms has been the substantial and persistent rise in the price of oil, which has in the past been a harbinger of rising corporate defaults. Reflecting the broadening of credit risk concerns, this appears to have driven a more or less continuous widening of spreads on investment-grade corporate bonds since the turn of the year.

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

Within the financial markets, in the midst of heightened asset price volatility, the values of asset-backed securities and structured credit products have been undergoing a protracted phase of risk repricing over the past six months. In many cases, the downward price adjustments have been substantial. The severity of the correction has been interpreted by many observers as evidence that investors had either dismissed or ignored repeated early warnings issued by the global central banking community and by international institutions that an increasingly aggressive hunt for yield was rendering their portfolios more and more vulnerable to the possibility of abrupt asset price corrections. Those investors who dismissed the warnings of growing risks may have done so on account of having genuinely different views of the true risks in markets for highly complex securities that had little track record, possibly relying too heavily on credit ratings with insufficient due diligence. Others may have done so because they had weaker risk management systems in place that led them to mis-price the risks. Market intelligence suggests, however, that there was a large body of investors who ignored the warnings and knowingly took on greater risk as the perceived costs, at least in the short term, of not sticking with the herd, were seen to outweigh the potential benefits of taking contrarian positions.

As was shown in the last issue of the FSR, the co-movement of indicators of financial market liquidity and risk aversion from mid-2005 onwards was consistent with a viewpoint that investors were acutely aware of growing risks but prepared to trade anyway. While it is challenging to precisely measure financial market liquidity, it is generally agreed that highly liquid markets are characterised by a myriad of buyers and sellers willing to trade, so assets can be traded in such markets easily and without moving prices too much. Generally speaking, the relationship

between risk aversion and financial market liquidity is negative – higher risk aversion is typically associated with lower market liquidity – possibly because investors feel less comfortable trading when risks are growing. This was not the case after mid-2005 when investors became increasingly risk averse but financial market liquidity stubbornly continued to rise. Indications of such behaviour would suggest that the problem was not so much with the ability of risk management systems to detect vulnerabilities but the way in which the information provided by the risk management functions within financial firms fed into investment and hedging decisions at a time when growing market share became an important business objective.

With the abrupt reversal of the hunt for yield, the so-called balance of greed and fear in financial markets was restored through a sudden loss of market liquidity after July 2007. As liquidity risk premia surged, the phenomenon of “pricing for perfection” came to an end. An important factor behind the loss of market liquidity was rapid and significant forced deleveraging imposed on the hedge fund sector as prime brokers tightened margin requirements and terms on their lending for the funding of leveraged positions. This retrenchment from risk-taking forced hedge funds to sell assets, depressing securities prices in some of the most liquid markets, not to mention financial markets whose functioning is critically dependent on their active presence. Nevertheless, the hedge fund sector proved remarkably and unexpectedly resilient in the first phases of the turbulence. An important reason for this was that exposures of the sector to the sub-prime and related securities markets appear to have been more limited than initially feared. For the largest and most sophisticated hedge funds, risk management capabilities are comparable to those of the proprietary trading desks of global investment banks but, in cases of co-investment of capital by hedge fund managers, a better alignment of their incentives with those of their investors may have kept a lid on their risk-taking.

Because of the rapidity with which hedge funds tend to turn over their portfolios, their trading presence in financial markets is disproportionately large relative to their assets under management. This means that financial stresses in the sector can quickly translate into vanishing market liquidity, thereby reducing market stability. As growing uncertainties about possible adverse second-round effects of the market turmoil on real economic performances started to percolate into broader asset markets – especially high-grade corporate credit and equity markets – in early 2008, hedge fund performances began to suffer and incidences of failure rose. At the same time, the total capital under management of single-manager hedge funds breaching so-called net asset value (NAV) triggers scaled new heights. Apart from the fact that hedge fund losses set a further round of deleveraging in motion, these breaches may have led prime brokers to further raise margin requirements on collateralised lending. Moreover, given that net investor flows into hedge funds can be influenced by past investment performances, the likelihood that the affected funds will face a surge of investor redemption demands may have also increased. Hence, at the time of writing, risks of financial market instability – including risks to the smooth functioning of euro area financial markets – related to growing balance sheet vulnerabilities within the hedge fund sector had increased.

As euro area large and complex banking groups began pre-announcing and then disclosing their financial results for the third quarter of the year in late 2007, the breadth and magnitude of their direct and indirect holdings of asset-backed securities and structured credit products exposed to US sub-prime mortgages turned out to be larger than might have been expected six or twelve months before. By the end of the third quarter reporting season in late November, and after the cut-off date of the last FSR, euro area LCBGs that report at quarterly frequency had collectively reported asset valuation write-downs amounting to almost €5 billion. This compared with just below €20 billion in losses incurred by their global LCBG counterparts.

As these figures were dwarfed by estimates of potential total valuation losses covering the entire stock of these securities outstanding, uncertainties about where the risks were ultimately being borne within the financial system intensified in early 2008. Moreover, there was growing anxiety that what had started out as a liquidity squeeze had the potential to challenge the creditworthiness of financial firms. As a consequence, the stock prices of euro area LCBGs came under renewed downward pressure and uncertainties – gauged by the volatility implied in the prices of options on their stocks – deepened with the approach of the reporting season for full-year 2007 audited financial statements. This led market participants to price in expectations of much larger write-downs and they demanded significantly higher risk premia on the securities prices of these institutions.

The reporting season for full-year 2007 financial statements eventually saw further write-downs by euro area LCBGs totalling just over €18 billion. At the same time, their global counterparts disclosed about €70 billion in additional sub-prime-related losses. Collectively these and other figures reported by other smaller banks and non-bank financial institutions significantly narrowed the gap with estimates of total global financial system losses. However, even after the reporting of financial results by several global LCBGs for the first quarter of 2008, a wide disparity still remained – especially from estimates based on market values of increasingly hard-to-value assets. This meant that uncertainty still remained about the possibility of further large losses being disclosed by key financial firms over the next few quarters.

Importantly from a euro area financial system stability viewpoint and, by extension, for future real economic performance, the full-year financial disclosures of euro area LCBGs revealed that while the fallout of the sub-prime-related turmoil had materially impacted on their profitability, it had left their capital buffers largely intact. While a few suffered outright losses in the second half of 2007, none of them endured an outright loss for the full-year.

Although the initial capital buffers of euro area LCBGs were hardly affected by the market turbulence, slower than expected income growth, coupled with great reluctance to cut dividends on account of fears about potential adverse signalling effects regarding future business prospects, meant that retained earnings, a key source of capital buffer growth, were commensurately lower. In addition, there was a rise in risk-weighted assets – a measure that adjusts the assets on a bank's balance sheet by weighting them with factors representing their riskiness and potential for default – which is the denominator in capital adequacy ratio calculations. Risk-weighted assets rose for a variety of reasons. In particular, there was some reintermediation of assets that had previously been held in off-balance-sheet structured investment vehicles (SIVs). Instances of reintermediation of off-balance-sheet entities were, however, far less frequent than had initially been expected during the autumn of 2007 as institutions which did not wind down SIVs through asset sales managed to refinance them with medium-term notes (MTNs) or, in the case of troubled asset-backed commercial paper (ABCP) conduits, to establish new conduit structures, leaving assets off balance sheet. A further contributor to the rise in risk-weighted assets was deterioration in underlying credit quality – including that of a pipeline of leveraged loans intended for distribution into the market that remained on balance sheet as acutely risk-averse investors eschewed exposures to such loans and to securitised assets more generally. Notwithstanding the slight overall negative impact on risk-weighted assets, capital adequacy ratios still comfortably exceeded regulatory minima for all euro area LCBGs at the end of 2007.

Looking ahead, since euro area LCBGs have generally not so far endured material capital buffer erosion as a result of the turmoil, the risk of deleveraging by these institutions of sufficient severity to induce a significant shortage of credit in the economy appears rather low. That said, a cautious assessment is warranted, leaving no room for complacency, not least because further write-downs may yet be disclosed. In

addition, in recent bank lending surveys banks have been explaining a much greater tendency to tighten credit standards at least in part by pointing to rising costs related to their capital. To a large extent, banks have been responding to the market turmoil and the exceptionally challenging operating environment created by it by retrenching from risk-taking. In other words, the signs are that it has been more banks' willingness than their ability to lend that has been affected by the turmoil. This has manifested itself in banks either keeping a lid on or cutting exposures to riskier business lines, such as commercial real estate, leveraged buyout financing and the provision of prime brokerage services to hedge funds.

As the real economy adjustment to the market turmoil proceeds, it can be expected that euro area LCBG profitability performances will continue to be dampened in the period ahead. Factors that are likely to inhibit profitability growth include the possibility of further valuation losses, persistently high funding costs facing banks, as well as an erosion of income from securitisation and financial market activities. Furthermore, there have been reports in recent bank lending surveys that credit demand of non-financial sectors has been falling and that it is expected to fall further. If the funding costs facing banks remain elevated and securitisation market functioning remains impaired, this could aggravate the situation even further. All in all, slower growth in retained earnings of some institutions can be expected in the period ahead. This will limit their short-term ability to grow balance sheets at the same rates as in the recent past. That said, it should create opportunities for unaffected institutions to increase their market shares.

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

The information which has become available since the last FSR suggests that the euro area financial system has undergone further substantial adjustment to the financial turmoil, while capital buffers have been maintained

largely intact. Indeed, some of the risks that had been highlighted in the December 2007 FSR materialised – including the possibility of further deterioration in US housing market conditions and of a broadening of credit market stresses. On the positive side, credit default swap (CDS) indices in Europe and the US have declined since mid-March, corporate bond spreads have narrowed across the board, the functioning of the leveraged loan market has been showing some tentative signs of improvement, and equity markets have started recovering, after sizeable losses in the final quarter of last year. This notwithstanding, by the cut-off date for including information and data in this issue (8 May), the risks to euro area financial system stability on balance had increased compared to the situation six months before. This assessment reflects several factors: conditions in the US housing market had further deteriorated as had the US macroeconomic outlook more generally; the valuation losses endured by mature economy banking systems were larger than anticipated six months ago; and banks have tightened their lending standards significantly. In addition, the euro area financial stability outlook is highly uncertain and a lot will depend on how macroeconomic conditions – especially those in the US housing market – develop and how banks respond to a much more challenging operating environment. The outlook also clearly depends on the extent to which initiatives and measures – both by policy-makers around the world and by the financial industry itself – which are aimed at restoring confidence in and strengthening the resilience of financial systems are eventually implemented.

Given heightened uncertainty and an environment in which balance sheet conditions could change unexpectedly, vigilance by financial institutions and market participants is of the essence and those with relevant exposures will need to step up their efforts to effectively manage the risks that may lie ahead. It is probable that the adjustment process within the financial system will be protracted as banks attempt to strengthen their liquidity and capital positions. This means that balance sheet

expansion is likely to be somewhat curtailed in the period ahead. In a negative scenario, the adjustment could risk perturbing the smooth intermediation of credit in the economy, which, if it materialised, would have a more negative impact on the real economy than previously anticipated. At the same time, the financial system may be more vulnerable than before to the crystallisation of other risks that have been identified in previous issues of the FSR that remain relevant, including the possibility of disorderly developments owing to global imbalances. Moreover, increases in energy prices have augmented the downside risks to the euro area growth outlook. That said, it should be recalled that the losses disclosed so far by affected financial institutions are mostly mark-to-market losses on hard-to-value assets. It remains to be seen whether the full extent of the implied credit losses will eventually be realised on the underlying loans. If the outturns ultimately prove less severe than currently feared, then it cannot be ruled out that those financial firms still holding these assets will see some offsetting valuation gains on the asset-backed securities and structured credit products in their portfolios.



## II THE MACRO-FINANCIAL ENVIRONMENT

### I THE EXTERNAL ENVIRONMENT

*Developments after the finalisation of the December 2007 FSR supported the perception that risks for the euro area financial system stemming from the external environment had increased. Conditions in the US housing market further deteriorated and this negatively affected the financial soundness of several global large and complex banking groups (LCBGs). It also made financing conditions facing US households and firms more challenging. By the cut-off date of this edition of the FSR, some major financial institutions had endured significant stress. Looking ahead, further tensions in global structured credit and some segments of the corporate credit market cannot be ruled out. This leaves open the possibility of additional risk repricing which, if it materialised, would further weaken the resilience of the financial system and possibly aggravate global credit conditions.*

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

##### GLOBAL FINANCIAL IMBALANCES

After the December 2007 FSR, current account imbalances narrowed somewhat in deficit

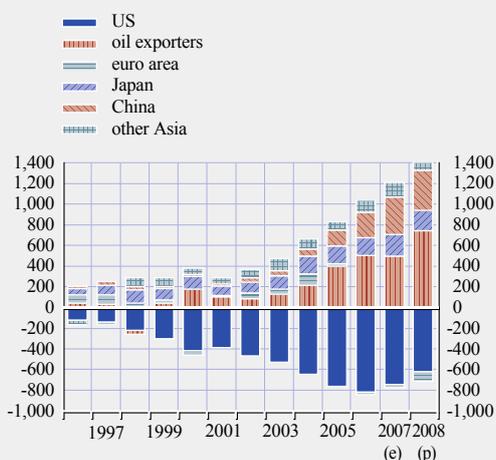
countries. In particular, the US current account deficit narrowed to 5.3% of GDP in 2007 – the first decline since 2001 – and was projected to decline further in 2008. Nevertheless, the prospect of continued gradual correction remained uncertain, owing to risks associated with high and increasing oil prices.

In the main surplus economies, developments did not point to significant improvements. China's current account surplus continued to widen to 11.1% of GDP in 2007 and was expected to decline only mildly in 2008, Japan's external surplus also increased markedly in 2007 and was expected to remain high in 2008, while the current account surplus of oil exporters – the main counterparts to the decline in the US external deficit in 2007 – is expected to increase in 2008, owing to rising oil prices (see Chart 1.1).

The financing of the US current account deficit has proceeded relatively smoothly since the last FSR. Net capital inflows had recovered by February 2008 from the turmoil-related fallout in August and September 2007 and were broadly diversified across instruments and maturities (see Chart 1.2).

**Chart 1.1 The US current account deficit and its counterparts**

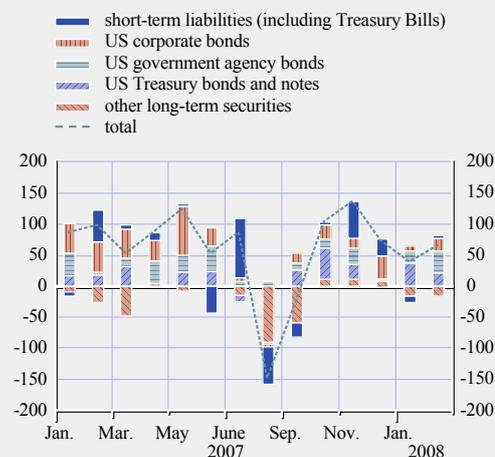
(1996 – 2008; USD billions)



Sources: IMF World Economic Outlook and ECB calculations.

**Chart 1.2 Net capital flows to the United States**

(Jan. 2007 – Feb. 2008; USD billions)



Sources: US Treasury International Capital System and ECB calculations.

**Table 1.1 Recent investments by sovereign wealth funds in the financial services industry**

(Jan. 2007 – Apr. 2008; USD billions)

Investor	Acquired company	Transaction value
Government Investment Company of Singapore	UBS	9.8
Abu Dhabi Investment Authority	Citigroup	7.6
Government Investment Company of Singapore	Citigroup	6.9
China Investment Corporation	Morgan Stanley	5.0
Temasek Holdings	Merrill Lynch	5.0
Kuwait Investment Authority	Merrill Lynch	3.4
China Investment Corporation	Blackstone	3.0
Korea Investment Corporation	Merrill Lynch	2.0
Temasek	Barclays	2.0
Qatar Investment Authority	London Stock Exchange	2.0
Temasek Holdings	Standard Chartered	2.0
Undisclosed Middle East investor	UBS	1.8
Mubadala Development Company	Carlyle Group	1.4

Source: Press reports.

On the investor side, officially recorded public sector purchases of US assets accounted for more than two-thirds of total purchases in the three months following the December 2007 FSR. This indicated a rising foreign public sector appetite for US assets.<sup>1</sup> In this respect, sovereign wealth funds (SWFs) could have become an important source of financing, having accumulated sizeable funds (estimates range between USD 2 trillion and USD 3 trillion). In 2007 alone SWF assets grew by well above USD 500 billion on account of investment income, newly transferred assets to existing funds and the creation of new funds.<sup>2</sup> SWF investments were mainly concentrated in the financial services industry (see Table 1.1). In particular, five large international banking corporations alone received funds in excess of USD 45 billion.

Going forward, the main source of uncertainty relates to the durability of current account developments, notably in deficit economies, and

in particular when considering developments in oil prices and financial markets.

## US SECTOR BALANCES

### Public sector

The US federal budget deficit declined to 1.2% of GDP in the 2007 fiscal year from 1.9% the year before.<sup>3</sup> For 2008 the deficit is projected to increase, mainly because of a fiscal stimulus package of around 1% of GDP and a decline in revenues due to weakened economic activity.<sup>4</sup>

The ratio of general government gross debt to GDP increased slightly from 60.1% in 2006 to 60.8% in 2007, according to the IMF, and it is projected to rise to 63.2% of GDP in 2008. IMF estimates point to a large US structural fiscal deficit, projected to peak at 3.8% of GDP in 2008. This indicates that further corrective measures might be needed to restore the fiscal balance.

### Corporate sector

The financial condition of US non-financial corporations remained relatively strong after the December 2007 FSR. Even though delinquency rates on corporate loans started to increase in the last quarter of 2007, they still remained close to 20-year lows. Charge-off rates of US commercial banks on commercial and industrial loans began increasing slowly from early 2006, but they are still well below the heights reached in 1991 and 2002.

So far, the effects of the ongoing financial market turmoil on US non-financial corporations have remained relatively contained on balance, but the differences between and within asset classes have been exceptionally large.

1 This compares with only one quarter in the first half of 2007.

2 These include the China Investment Corporation, the Australian Government Future Fund and the Russian Future Generations Fund.

3 The US fiscal year begins on 1 October.

4 Approximately two-thirds of the fiscal package consists of income tax rebates for households, while the remaining third comprises investment incentives.

Growth in US corporate profits decelerated further after the finalisation of the last FSR, with both non-financial and financial sectors' profit growth turning zero or negative in the fourth quarter of 2007 owing to the financial turmoil (see Chart 1.3).

Looking ahead, a further decline in the rate of domestic US profit growth can be expected owing to the worsened US economic outlook and the ongoing market turmoil.

US corporate external financing has been increasing since the beginning of 2006 and reached 1.8% of GDP in 2007, owing to moderating profit growth – as reflected by the decline in internal cash-flow funding as a share of GDP – and relatively robust business spending.

Despite the positive financing gap, the ratio of debt to net worth of the US non-financial corporate sector stood at 39% at the end of 2007, its lowest value for about 20 years. Looking ahead, the widening finance gap may, however,

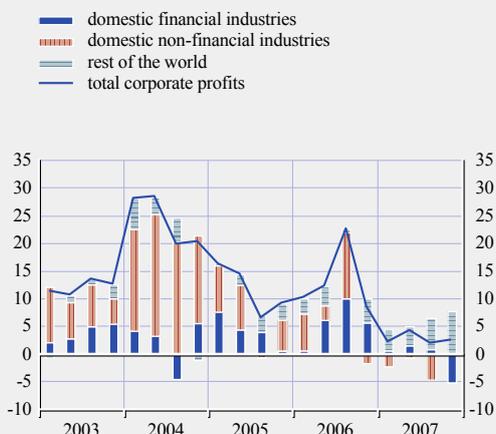
prove to be a risk, if the ongoing financial market turmoil and ongoing repricing of risk heighten further.

As regards bond issuance (see Chart 1.4), volumes and prices of investment-grade bonds have remained relatively unaffected by the turmoil, while speculative-grade bond markets have been hit harder. Similarly, although the issuance of non-financial commercial paper declined in the second half of 2007, the problems have been more severe in the lower quality segment. Net equity issuance dropped after August 2007 (see Chart S2), reaching new lows at below -8% of GDP. This decrease was related to the decrease in both initial public offerings (IPOs) and share buyback programmes.

Due to problems in the commercial paper market, the demand for substitute commercial and industrial (C&I) loans has increased. This might represent a risk for the non-financial corporate sector, in particular owing to a considerable tightening of lending standards by

Chart 1.3 US corporate sector profits

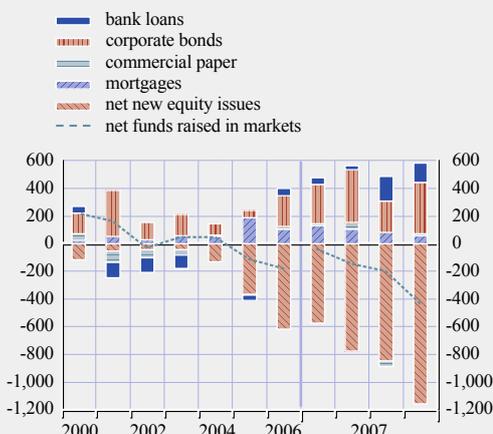
(Q1 2003 – Q4 2007; percentage point contribution to year-on-year profit growth; seasonally adjusted)



Source: US Bureau of Economic Analysis.  
Note: 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

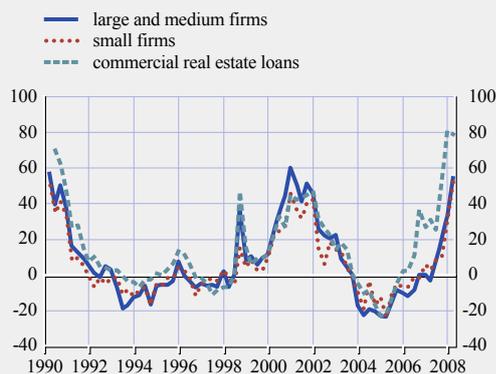
(2000 – 2006; USD billions)



Source: Federal Reserve Board of Governors.

**Chart 1.5 US banks' credit standards on loans to firms**

(Q1 1990 – Q1 2008; net % of domestic respondents reporting a tightening in standards)



Source: Federal Reserve Board of Governors.

US banks.<sup>5</sup> The April 2008 Senior Loan Officer Opinion Survey on Bank Lending Practices indicates that the percentage of banks reporting a tightening of credit standards has increased further (see Chart 1.5).

Overall, the ongoing financial market turbulence increased the risk of balance sheet deterioration for US non-financial corporations after the finalisation of the December 2007 FSR. Risks have extended widely, but – owing to the robustness of balance sheets before the turmoil – the net impact has thus far remained fairly contained. Looking forward, a prolonged tightening of financing conditions would entail higher risks for financial stability, as this could fuel an increase in defaults.

#### Household sector

Households' total net wealth declined in the last quarter of 2007 for the first time since 2002, driven partly by a decrease in the value of both real and financial assets and the continued increase in household liabilities, albeit at a slower pace.

After the publication of the December 2007 FSR, the US mortgage market has been characterised by escalating difficulties that originated in the US sub-prime mortgage market (accounting for around one-fifth of all mortgage originations

during the housing market boom). Other non-conforming mortgage markets (for example Jumbo mortgages and the so-called Alt-A markets) were also affected by high delinquency and foreclosure rates.<sup>6</sup>

With an overhang of unsold homes near to its highest level in decades, US house prices remained under downward pressure in the past six months. This poses a risk for US consumer confidence and consumption, both directly through decreased employment as a result of a sizeable drop in residential investment, and indirectly through the wealth effect and uncertainty. At the same time, due to the increased delinquency and foreclosure rates, the risk of a further tightening of lending standards has increased.

As regards US household assets, broad measures of house price inflation in the US declined further after the finalisation of the last FSR. According to the Office of the Federal Housing Enterprise Oversight (OFHEO) index – used as a basis for gauging housing wealth change in the flow of funds – house price inflation was slightly negative in the last quarter of 2007 for the first time in the history of the index. The S&P 500/Case-Shiller index of house prices, which focuses on the larger US cities, indicates more substantial decreases: it fell by almost 9% in the fourth quarter of 2007 relative to the previous year (see Chart 1.6). Looking ahead, futures prices for the S&P 500/Case-Shiller index indicate that US house prices could fall further during 2008 and 2009. In all, they are factoring in a peak-to-trough decline of close to 30%.

The average US house price decrease masks heterogeneity across states and cities. At the state level the largest year-on-year price declines were registered in coastal states – where house prices rose at above-average rates during the

<sup>5</sup> The willingness and ability of banks to extend loans is summarised in the Federal Reserve's April 2008 Senior Loan Officer Opinion Survey on Bank Lending Practices.

<sup>6</sup> A conforming mortgage is a loan that is eligible for purchase by the two major Federal agencies that buy mortgages, Fannie Mae and Freddie Mac.

Chart 1.6 US house price inflation

(Q1 1992 – Q4 2009)

- OFHEO (% change per annum; left-hand scale)
- ..... S&P500/Case-Shiller (% change per annum; left-hand scale)
- - - S&P500/Case-Shiller (index: June 2006 =100; right-hand scale)
- futures prices on 25 April (index: June 2006 =100; right-hand scale)

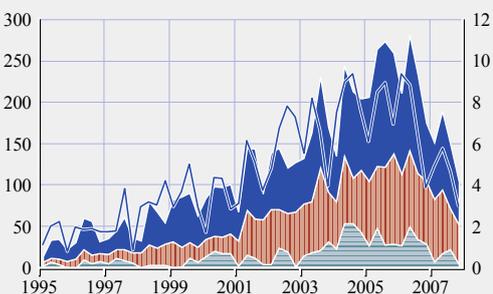


Sources: OFHEO and Standard & Poor's.

Chart 1.7 Mortgage equity withdrawal in the United States

(Q1 1995 – Q4 2007)

- turnover of existing homes (USD billions; left-hand scale)
- ..... cash-out refinancing (USD billions; left-hand scale)
- - - home equity borrowing (USD billions; left-hand scale)
- total (% of disposable income; right-hand scale)



Source: Federal Reserve Board of Governors.

boom – and in states with structural economic problems. By contrast, in 36 US states house prices had increased by more than the US average by the end of 2007.

Household debt growth has broadly followed house price developments since the last FSR. The annualised quarter-on-quarter growth rate in the fourth quarter of 2007 eased somewhat to 5.6%, as both mortgage and consumer credit growth rates declined. In early 2008 consumer credit growth was showing some further signs of easing off. Total debt as a share of disposable income continued to increase (see Chart S5).

Declining housing values have also resulted in a decline in mortgage equity withdrawal (see Chart 1.7), which fell to around 3% in the last quarter of 2007. All of its main components – home equity borrowing, cash-out refinancing and the turnover of existing homes – had declined.

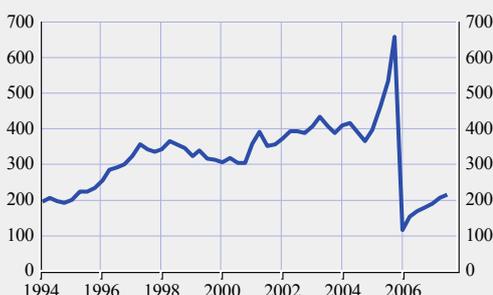
The household debt service ratio and the wider financial obligations service ratio still both stood at their highest levels since 1980 but were showing some signs of stabilisation since the last FSR (see Chart S6). While most households are able to repay their debt obligations, the number

of US households filing for bankruptcy has been increasing steadily since at least early 2006 (see Chart 1.8).

The most notable credit problems have occurred in the sub-prime segment of the US mortgage market, where delinquency rates increased to over 17% of total sub-prime mortgages in the fourth quarter of 2007 (see Box 1). Delinquency rates for residential mortgage-backed securities on sub-prime adjustable-rate mortgages are

Chart 1.8 Personal bankruptcy filings in the United States

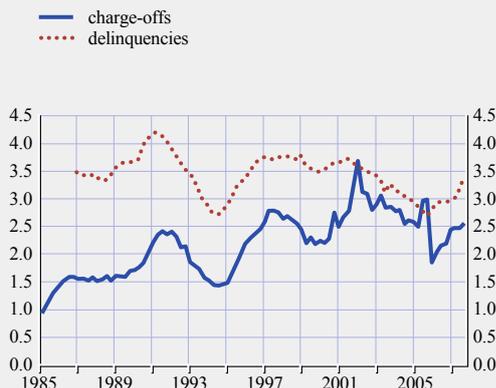
(Q1 1994 – Q3 2007; thousands)



Source: US bankruptcy courts.  
 Note: The surge and subsequent drop in bankruptcy filings in late 2005 and early 2006 may be due to the Bankruptcy Abuse Prevention and Consumer Protection Act, which was signed into law in October 2005 and has made it more difficult for individuals filing for bankruptcy to have their debts written off.

**Chart 1.9 Charge-offs and delinquencies on consumer loans in the United States**

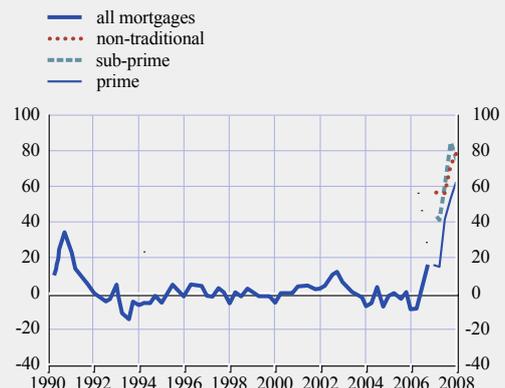
(Q1 1985 – Q4 2007; %)



Source: Federal Reserve Board of Governors.

**Chart 1.10 US banks' credit standards on mortgages to individuals**

(Q1 1990 – Q1 2008; net % of banks reporting a tightening of credit standards)



Source: Federal Reserve Board of Governors.

Note: In recent surveys, banks were questioned separately about changes in standards for prime, non-traditional and sub-prime residential mortgages. The responses are depicted as points on the chart.

highest for the more recent vintages, indicating a risk of further sub-prime mortgage-related losses. In the short term, the Federal Reserve interest rate cuts should help cushion the reset shock on adjustable-rate mortgages. In addition to sub-prime mortgages, charge-offs and delinquencies on other consumer loans continued to rise in the fourth quarter of 2007 (see Chart 1.9).

Thus far the conventional prime mortgage market has been relatively unaffected by the turbulence. At the end of 2007 the effective conforming mortgage interest rates were close to their 2006 average. At the same time, loan-to-value (LTV) ratios on these mortgages rose from around 75% to around 80% by the end of 2007. However, in early 2008 LTV ratios declined sharply, consistent with recent survey indicators on tightening credit conditions. In particular, the Federal Reserve's April 2008 bank lending survey points to a further tightening of lending standards for all types of mortgage loans (see Chart 1.10).<sup>7</sup> The net percentage of banks reporting tighter standards on consumer loans and credit card loans also increased substantially in the three months to April 2008.

All in all, the risks originating in the US sub-prime mortgage market identified in previous editions of the FSR have materialised. Looking ahead, whilst the bulk of the credit problems of US households remained largely in the sub-prime mortgage market, rising mortgage interest payments and falling housing wealth coupled with tighter credit standards are likely to weaken US household balance sheets more broadly. In addition, falling house and – to a lesser extent – equity prices could affect consumption via negative wealth effects. Despite a substantial easing of interest rates, uncertainty remains exceptionally high.

<sup>7</sup> See the Federal Reserve's April 2008 Senior Loan Officer Opinion Survey on Bank Lending Practices.

Box I

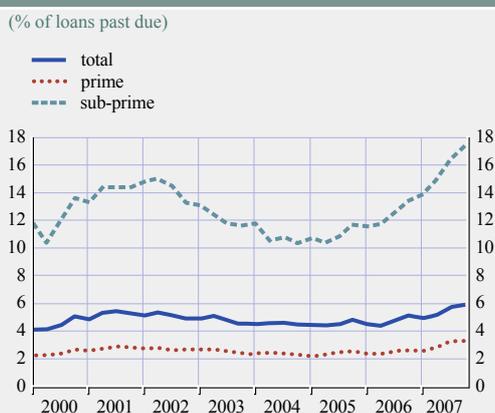
**US MORTGAGE MARKETS, MORTGAGE RESETS SCHEDULED IN 2008, AND THE RECENT FED INTEREST RATE CUTS**

Delinquency and foreclosure rates on US mortgages started to increase in mid-2006, especially for adjustable-rate sub-prime mortgages (see Chart A). Compared to the previous economic downturn in 2001-2002, delinquency rates have not been exceptionally high. However, a new structural feature of the market is the substantial share of sub-prime mortgages, which increased from just over 10% of the total stock of mortgage loans in 2000 to over 20% in 2006. This category of mortgage loan exhibited a much higher incidence of delinquency, with sub-prime adjustable-rate mortgages (ARMs) registering a delinquency rate of 20% in the fourth quarter of 2007, up from 6.6% in the first quarter of 2006.<sup>1</sup> In this sub-category, the US Treasury estimates that approximately 1.8 million adjustable-rate sub-prime mortgages – with an estimated value of between USD 300 and USD 400 billion – will reset in 2008 and 2009.<sup>2</sup> The bulk of these resets are expected to take place during the first three quarters of 2008 and should decline rapidly thereafter. As the fragility of sub-prime ARM mortgages is pivotal to the financial stability outlook at the current juncture, this box explores how the interest rate burden implied by these resets varies with the interest rate.

Typically, adjustable-rate mortgages are tied to short-term market interest rates which are relatively close to the Federal Funds Rate, such as the six-month LIBOR, the Constant Maturity Treasury (CMT) index, and the Cost of Funds Index (COFI) (see Chart B). ARMs typically include a margin, which for the sub-prime category is usually very high – for a typical sub-prime ARM originated in 2006 this margin was around 5.5%. Combined with the LIBOR rate, this would amount to an effective interest rate of 10.8%. Moreover, a typical sub-prime

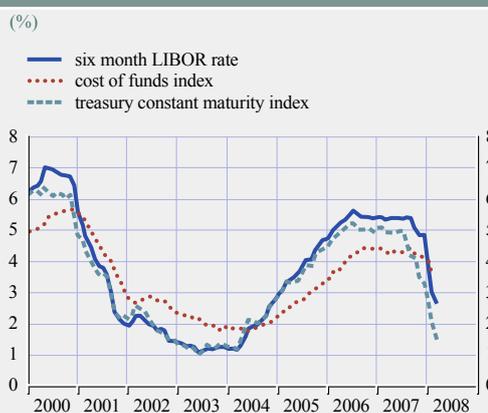
1 This compares with an increase in sub-prime fixed-rate mortgage delinquencies from 9.6% to 12.5% over the same period, and an increase in prime ARM delinquencies from 2.3% to 5%.  
 2 As there is no such thing as a typical sub-prime mortgage, it is very difficult to obtain reliable data on them. Quite often the numbers referred to in public are based on estimates computed by investment banks. This box is based on such information.

**Chart A US mortgage delinquency rates**



Source: Mortgage Bankers Association.

**Chart B Adjustable-rate mortgage reference rates in the United States**



Sources: Federal Reserve Board, Federal Home Loan Bank of San Francisco and Global Insight.

**Chart C Sub-prime mortgage rate paths with different money market rate assumptions**



Sources: Global Insight, Bloomberg, ECB calculations.

ARM also contained a two-year period with a fixed, discounted margin, the so-called “teaser rate”, after which it reset upwards, in cycles of generally six months. For a sub-prime ARM originated in 2006 this teaser rate was typically around 7.5%. Finally, sub-prime ARMs typically included an initial cap for the first rate reset, preventing the rate from adjusting by more than 2 to 3% over the teaser rate.

In August 2007, the typical sub-prime effective rate would have reset to above 11 percentage points, more than 3 percentage points above the initial rate (see Chart C). The size of such resets was widely perceived as a serious burden on US households. To gauge how subsequent Federal Reserve interest rate cuts have influenced the additional servicing burden that affected households will face as a result of resets, three different interest rate scenarios are considered: reset to the September 2007 rate, the February 2008 rate (in both cases the rates are assumed to stay constant) and the market expectations rate of February 2008.<sup>3</sup> The scenarios are represented by blue dotted lines (see Chart C). The reset rate declined rapidly as the Federal Reserve implemented rate cuts after August 2007. It would imply that the first reset in 2008 would raise the servicing cost of such mortgages by only around 0.5 to 1 percentage point above the teaser rate.

Although the situation now looks more positive, these scenarios should be interpreted cautiously. In particular, they do not take account of the fact that additional causes for concern are weakening employment which may adversely affect income conditions and the outlook for house prices. The latter is especially relevant since history has shown the loan-to-value ratio, which is dependent on the level of house prices, to be the single-best predictor of US mortgage holders’ decision to default on a mortgage. Looking further ahead, it is important to bear in mind that when the US economy eventually strengthens, it can be expected that short-term interest rates will also rise so that sub-prime reset rates will also rise.

<sup>3</sup> In February 2008 markets were expecting LIBOR to decline to close to 2¼% by September 2008, and then to start to increase slowly and reach the current level only by the end of 2009.

## REGION-SPECIFIC IMBALANCES

### Non-euro area EU countries

Financial systems in non-euro area EU countries have remained generally sound since the December 2007 FSR, but risks to financial stability in a number of areas have increased in recent months.

The outlook in most of the non-euro area EU countries has deteriorated recently, especially in the United Kingdom and the Baltic States.

The balance of risks to the GDP outlook in the non-euro area EU countries is on the downside. Moreover, according to official statistics and anecdotal evidence, house prices in a number of non-euro area EU countries have started to moderate, especially in the United Kingdom and the Baltic States. In some countries a weakening of commercial property markets has also been observed.

Although the house price moderation is a welcome development after a long period of

very rapid house price increases and possible overvaluation in some countries, falling house prices clearly pose some important risks to financial stability. In the United Kingdom they may limit the ability of households to borrow against property to consolidate debts, and personal bankruptcies and foreclosures may intensify. Similarly, the highly leveraged real estate sector in the non-euro area EU countries in general may face problems with debt repayment, possibly leading to capital losses for the financial institutions involved.

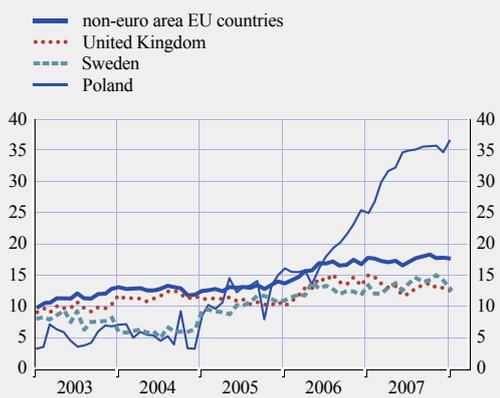
While the adverse spillover from the recent financial turmoil has been limited in most of the non-euro area EU countries, the United Kingdom is an exception owing to recent stresses endured by some large financial institutions. According to the Bank of England survey of credit conditions, UK banks have tightened price and non-price terms offered for new loans to households and businesses and they are expected to further restrict credit supply in the near term. Further tightening of lending will partly depend on the extent of capital losses and rising default rates stemming from the possible slowdown in economic activity and higher borrowing costs.

In other non-euro area EU countries, credit growth to the private sector has remained strong since the last FSR (see Chart 1.11). Whereas credit growth ranged between 30% and 60% in Bulgaria, Romania and the Baltic States, there was some stabilisation in Poland and moderation in Estonia and Latvia.

Looking forward, rising inflation in non-euro area EU countries may imply higher official and retail interest rates, which may further curb credit growth and hamper household balances. Given the high exposure of foreign banks to central and eastern European countries a possible deterioration in the financial condition of parent banks might impact negatively on funding costs, especially in countries with high loan-to-deposit ratios. On the other hand, rising concerns about an economic slowdown in central and eastern Europe, particularly in the Baltic States, add to the risks facing banking sectors in Austria and

Chart 1.11 Credit to the private sector in non-euro area EU countries

(Jan. 2003 – Jan. 2008; % change per annum)



Sources: ECB and national central banks.

Sweden – the two western European countries with the highest involvement in this region. At the same time, risks related to foreign currency lending in some of the non-euro area EU countries in central and eastern Europe remain.

#### Emerging economies

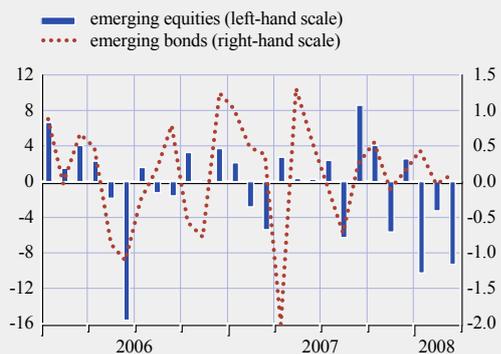
Emerging economies remained relatively resilient to the slowdown in the US economy after the finalisation of the December 2007 FSR, supported by robust domestic demand, notably in the large economies such as China and India. Adverse spillovers to emerging economy exports from slowing demand in mature economies were mostly limited to those economies that trade most heavily with the United States, and macroeconomic risks resulting from the reduced contribution of emerging economies to global demand should remain contained.

Private capital flows to emerging economies reached about USD 780 billion in 2007 and were expected to remain vigorous in 2008, at about USD 730 billion.<sup>8</sup> This was a consequence of the underlying strength of many emerging economies, the reduction in US interest rates that supported flows to higher-yielding markets

<sup>8</sup> See Institute of International Finance (2008), “Capital flows to emerging market economies”, March.

**Chart 1.12 Capital inflows into emerging economies from dedicated emerging market economy funds**

(Jan. 2006 – Mar. 2008; USD billions, in net terms)



Source: EPFR Global.

and rising expectations of interest rate hikes and/or appreciation of currencies.

In contrast, portfolio investment in emerging economies declined in 2007 relative to 2006, reflecting a sell-off of emerging market equities in the latter part of the year amid mounting concerns about the global implications of the US sub-prime crisis (see Chart 1.12).<sup>9</sup>

Looking ahead, one of the main uncertainties weighing on the emerging economy outlook is whether these economies can remain unscathed by a protracted slowdown in mature economies. Beyond the adverse impact from slowing exports, weaker growth in mature economies could affect commodity prices, in turn affecting foreign currency inflows, especially in Latin American economies such as Brazil.

A persistence of the turbulence in financial markets would further cloud the outlook, as tighter global credit conditions could adversely affect demand in emerging economies, especially in those relying on external financing to fund their current account deficits.

Credit in both domestic and foreign currencies is continuing to grow rapidly. This reflects a process of financial deepening, but also represents a potential risk should there be a deterioration in credit quality. The supply of

credit to these economies could fall if banks were to become more risk averse, as discussed in the last edition of the FSR.

After the finalisation of the December 2007 FSR, buoyant food and energy prices and strong domestic demand have made more formidable the challenge of dealing with inflationary pressures, in particular in economies with exchange rates that are heavily managed vis-à-vis the US dollar, such as China or the economies of the Gulf Cooperation Council. Raising interest rates in these economies may further encourage capital inflows and fuel domestic liquidity.

Overall, the main risks facing emerging economies which were highlighted in previous editions of the FSR remain, in particular those related to their reliance on growth prospects in mature economies. A risk which increased significantly was that linked to challenges in dealing with rising inflationary pressures. Also, risks related to a downward correction in the contribution of emerging market economies to global demand rose further, but so far remain contained.

## 1.2 KEY DEVELOPMENTS IN INTERNATIONAL FINANCIAL MARKETS

### US FINANCIAL MARKETS

#### The money market

Strains in the interbank market waxed and waned after the finalisation of the December 2007 FSR, fuelled by heightened liquidity and creditworthiness concerns relating to the banking sector. The outlook for the US housing sector also weighed heavily on market sentiment, as did concerns about the condition of banks' balance sheets as a result of sizeable write-downs reported by several US LCBGs in late 2007 and early 2008.

The narrowing of the three-month LIBOR-overnight indexed swap (OIS) spread in December 2007 suggested that concerted

<sup>9</sup> By contrast, inflows into emerging bonds have remained positive since October 2007.

**Chart 1.13 Three-month LIBOR-overnight indexed swap (OIS) spread**

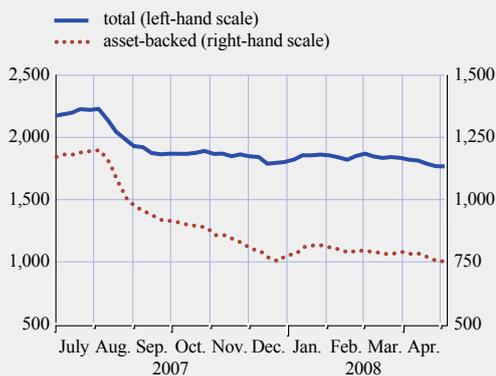
(July 2007 – May 2008; basis points)



Source: Bloomberg.

**Chart 1.14 Total amounts of commercial paper outstanding in the United States**

(July 2007 – May 2008; USD billions)



Source: Bloomberg.

central bank action towards the end of the year brought some relief to money markets. The announcement by the Federal Reserve in December that it would conduct a series of term repurchase agreements extending into the New Year and of a commitment to provide sufficient funding for the year-end also helped. This was followed by interest rate cuts by the Federal Open Market Committee in mid-December and again in January which brought rates down by a combined 100 basis points. A further generally anticipated cut followed at the end of that month, bringing rates down to 3.00%. As money market tensions re-emerged in February, the Federal Reserve increased the size of the term auction facility (TAF) and also initiated a further series of term repurchase agreements. Renewed concerted central bank action in March appeared to again return some confidence to money markets, but tensions again re-emerged and spreads in May again stood at levels just below 80 basis points (see Chart 1.13).

The amount outstanding of US commercial paper (CP) remained relatively stable at just below USD 2 trillion in the six months after the finalisation of the December 2007 FSR, following a contraction of around USD 350 billion in the initial phases of the market turmoil. The asset-backed segment (ABCP), however, continued contracting before recovering only

modestly in early 2008, reflecting ongoing difficulties in issuing and rolling over structured products (see Box 2 and Chart 1.14).

Tensions in the money market also began to affect the foreign exchange swap market towards the end of 2007, possibly resulting from European banks seeking US dollar liquidity to alleviate CP-related funding needs. The concerted response of central banks was also aimed at addressing pressures in the foreign exchange swap market, with the ECB offering two USD liquidity-providing operations.

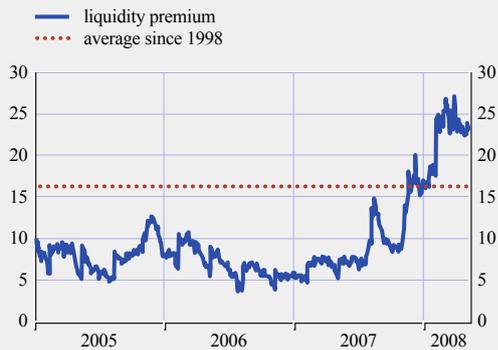
Looking ahead, risks in the US money market are linked to uncertainties about the liquidity needs of market participants. Perceptions of counterparty credit risk in the interbank market and amongst hedge funds are also likely to play an important role in shaping US money market conditions in the period ahead. Finally, the outlook is clouded by the distinct possibility of credit spreads remaining at elevated levels over a protracted period.

#### Government bond markets

Over the past six months, US government bond yields have declined further as investors have become more pessimistic about the economic outlook (see Chart S24). Additional downward pressure on yields emanated from

**Chart 1.15 Liquidity premium in the US government bond market**

(Jan. 2005 – May 2008; basis points)

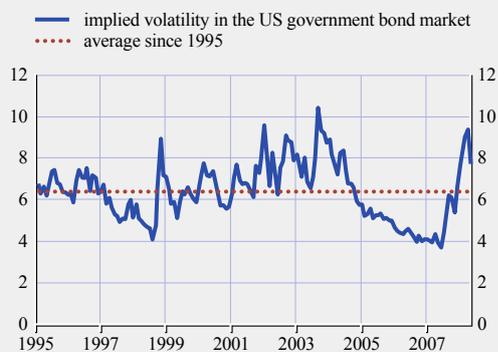


Source: Board of Governors of the Federal Reserve System.  
 Note: The liquidity premium is calculated as the difference between the yields on 10-year off-the-run and on-the-run Treasury securities.

investors' increased preference for safe and liquid assets. As evidence of the importance of the latter factor, the liquidity premium – measured as the differential in yields between most recently issued and older-dated ten-year Treasury securities – widened substantially after the outbreak of the financial turmoil (see Chart 1.15). This was due to the increased investor preference for the most recently issued securities which tend to be more liquid.

**Chart 1.16 Implied volatility in the US government bond market**

(Jan. 1995 – Apr. 2008; % per annum; monthly averages of daily data)



Source: Bloomberg.  
 Note: The implied volatility series represents the nearby implied volatility on the near-contract generic future.

Implied bond market volatility, which gauges investor uncertainty about the probable range of near-term movements in bond yields, also increased further after the December 2007 FSR (see Chart 1.16).

Looking ahead, the near-term risks for US government bond yields will depend upon investor appetite for the most liquid securities. If investors show greater willingness to bear liquidity risk in other financial markets, then this would place upward pressure on government bond yields. However, this may be counterbalanced by general business cycle uncertainties.

#### Credit markets

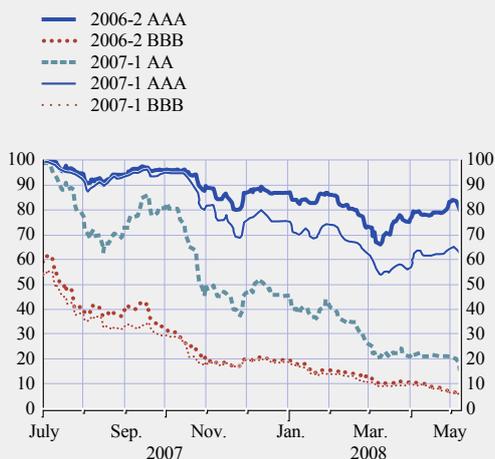
Credit markets underwent a protracted phase of risk repricing after the finalisation of the December 2007 FSR. Credit default swap (CDS) spreads on securities backed by various types of collateral increased substantially over the past six months. At the same time, there were substantial falls in asset-backed security (ABS) and collateralised debt obligation (CDO) issuance volumes.

Up to March 2008 CDS spreads on sub-prime mortgage-backed securities across the rating class spectrum increased on account of increasing delinquencies on the underlying mortgages and fears that US housing prices would continue falling. However, after the rescue of Bear Stearns, the CDS spreads on triple A-rated sub-prime residential mortgage-backed securities (RMBSs) recovered somewhat. This was reflected in increasing implied mark-to-market values of AAA tranches of the ABX index (see Chart 1.17).

The more or less continuous widening of spreads on sub-prime mortgage-related securities also spilled over to other ABS markets – including for securities backed by commercial mortgages, auto receivables and credit card receivables – as well as to CDOs (see Chart 1.18).

**Chart 1.17 Value index of CDSs on asset-backed US sub-prime non-agency securities (ABX indices)**

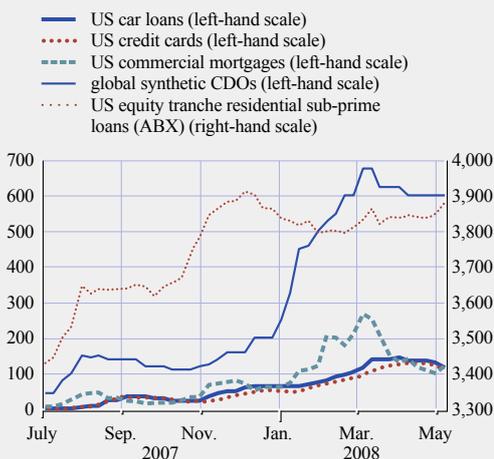
(July 2007 – May 2008; par value = 100; different vintages and ratings)



Source: JPMorgan Chase & Co.

**Chart 1.18 Spreads on various asset-backed securities and synthetic collateralised debt obligations (CDOs)**

(July 2007 – May 2008; basis points)



Source: JPMorgan Chase & Co.

This broad-based repricing of credit risk across US structured finance markets was triggered by significant deleveraging by hedge funds and by a considerable drop in the demand for these securities by SIVs, conduits and banks, which were faced with much more challenging financing conditions. The plunge in demand for ABSs and CDOs was rather abrupt and it led to a situation where liquidity in these markets all but vanished. Hence, the widening of spreads not only reflected greater sensitivity to the pricing of credit risks but also to market liquidity risk.

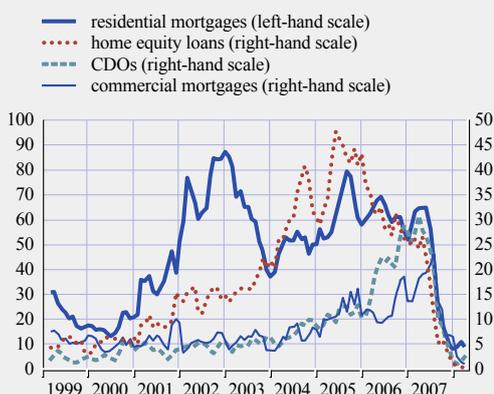
Against a background of lower investor risk appetite and wider spreads on ABSs and CDOs over the past six months, there was also a significant drop in securitisation issuance volumes to pre-2000 levels. This decrease was particularly visible for securities backed with residential mortgages, commercial mortgages and home equity loans, as well as for newly issued CDOs (see Chart 1.19).

Increased risk aversion in credit markets after the finalisation of the December 2007 FSR had also a marked upward impact on spreads on corporate bonds across the whole rating class spectrum and led to an increase in the main US CDX indices (see Charts S34 and S36).

Notwithstanding heightened uncertainties, after March 2008, there were signs that conditions in ABS and CDO markets were strengthening. Indications of this included the reappearance of demand for some higher-rated securities and less risky tranches of many ABSs and CDOs. In this vein, liquidity in many segments of the ABS markets improved, which was reflected in some spread narrowing, although spreads still remained

**Chart 1.19 Securitisation volumes in the United States by type of collateral**

(Jan. 1999 – May 2008; USD billions; three-month moving average)



Source: Dealogic.

much wider than during the summer of 2007 (see Chart 1.18).

Looking ahead, the outlook for US credit markets is surrounded by considerable uncertainty. In particular, spreads may remain elevated until those

US LCBGs that are active in these markets have completed their balance sheet repair and as long as leveraged investors, especially hedge funds, face funding challenges. In addition, the expected magnitude and duration of the US economic slowdown will also play an important role.

## Box 2

### THE ROLE OF STRUCTURED MARKETS IN PROPAGATING THE INITIAL SUB-PRIME SHOCK

Notwithstanding the positive contribution they can make in facilitating portfolio diversification and the distribution of risk across a wide range of investors – thus enhancing credit risk management possibilities – structured finance markets played a central role in propagating the initial sub-prime mortgage market shock across broader credit markets (see Figure A). This box examines some of the factors which contributed to such propagation.

Factors that played a central role in the recent market turmoil included a loss of confidence in the valuation of complex structured products and an increase in uncertainty among investors about the adequacy of their ratings in a context of scant information for risk assessment. This highlighted an already well-known weakness of the originate-and-distribute business model of banks. In particular, it showed that the ability to transfer credit risks may detract from adequate assessment and pricing of credit risk by loan originators and that it can dilute incentives for gathering and passing on accurate information. Whilst reputation risk may mitigate these problems, it cannot fully eliminate them.<sup>1</sup> Furthermore, some instruments that were intended to facilitate a transfer of risk away from the banking sector fell short of their objective, as the triggering of contractual liquidity clauses brought initially transferred risk back onto the sponsoring banks' balance sheets.

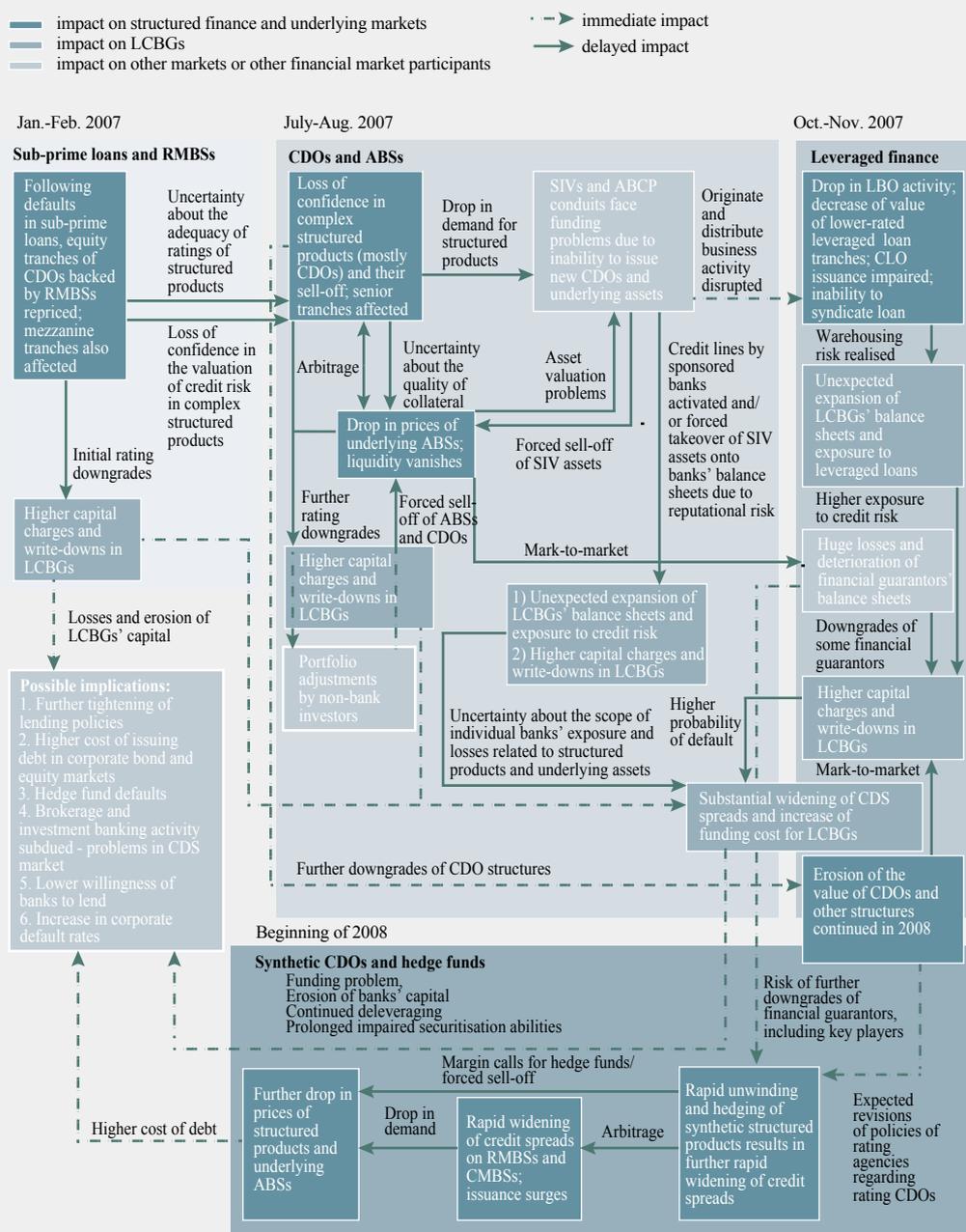
Investor uncertainty about both the value of structured credit products and the extent to which risk had been redistributed within the financial system by them drove an initial asset sell-off. This triggered a further drop in prices and financial institutions which held such securities were obliged to mark them to market, which led to them having to bear sizeable write-downs. In addition to the losses that banks faced due to capital charges and write-downs resulting from downgrades and decreasing prices of collateralised debt obligations (CDOs) and asset-backed securities (ABSs), important links to third parties in the valuation of the structures came to the fore, such as the role of financial guarantors (see Box 4). Banks and insurers faced further mark-to-market losses from higher capital charges on securities guaranteed by these institutions. In addition, banks' exposures to financial guarantors as counterparties in CDS hedges on ABS CDOs proved to represent the lion's share of the burden. Both guarantees and hedging appeared highly concentrated among the largest banks and securities firms, posing a substantial risk for financial stability.<sup>2</sup>

1 It is worthwhile recalling that the term "structured" covers a broad range of products with varying complexity and/or risk. The "principal-agent problems" characterising the products can be influenced by such considerations.

2 According to a Moody's survey, these hedges amount to approximately USD 120 billion and are concentrated among 20 banks and securities firms (see Moody's (2008), "Analytical Update on Guarantor Exposures at Global Banks and Securities Firms", February).

All in all, measures aimed at quickly restoring and strengthening confidence in structured credit markets and in their intermediation function are needed to stop further financial sector deleveraging. This would help to avoid possible negative spillovers to the underlying credit instruments and financial intermediation more generally.

**The chronology and links of propagation of the sub-prime shock across structured finance markets**



Source: ECB.

### Equity markets

Following the resilience exhibited during the initial phases of the financial turmoil, US equity markets experienced considerable declines after early November as intensified concerns about the overall economic outlook began to emerge (see Chart S26). US financial stocks in particular were also negatively affected by the revelation of large losses, mostly related to mortgage-backed instruments. Uncertainty, measured by stock market implied volatility, rose further from the already elevated levels recorded in November (see Chart S27) amid a notable deterioration in investors' risk appetite (see Chart S18). However, after mid-March uncertainty among investors abated significantly.

A strong decline in actual earnings per share growth in the past six months also weighed down on equity prices. Reported earnings per share growth for the corporations making up the S&P 500 index turned negative in January 2008, driven to a large extent by the losses reported by the financial sector. As regards stock market valuations, however, the price-earnings (P/E) ratio for all US listed companies stood in early May slightly above its historical average since 1973 (see Chart S29 for the corresponding measure based on ten-year trailing earnings).<sup>10</sup>

Looking ahead, the main risk facing the US equity market is the distinct possibility that the rather sanguine expectations of analysts regarding future earnings growth over the next twelve months will not be met. Futures on the benchmark US implied equity volatility index, the VIX, suggest that investors expect the considerable swings in equity prices observed over recent months to persist at least for the rest of the year (see Chart 1.20).

### EMERGING FINANCIAL MARKETS

In contrast to patterns observed in the initial stages of the current turmoil, some correction has been observed in emerging financial markets since the last FSR. Emerging market equity valuations lost about 5% between

**Chart 1.20 Implied volatility in US equity markets**

(Jan. 2007 – May 2008; % per annum)



Source: Bloomberg.

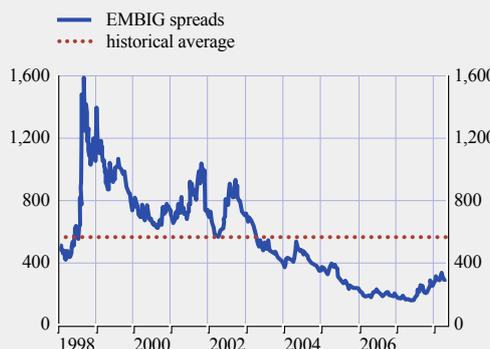
Note: The spot implied volatility index represents the VIX index, and the futures series show the expected future levels of spot implied volatility (and related premia) as implied by futures contracts written on the VIX index.

early November 2007 and early May 2008 (see Chart S39), the Emerging Market Bond Index Global (EMBIG) spread widened by 40 basis points (see Chart S37), and yields on long-term domestic bonds rose by 30 basis points (see Chart S38).

<sup>10</sup> A breakdown into financial and non-financial stocks shows a very similar picture of price-earnings ratios standing close to their historical averages.

**Chart 1.21 Emerging market economy sovereign bond spreads**

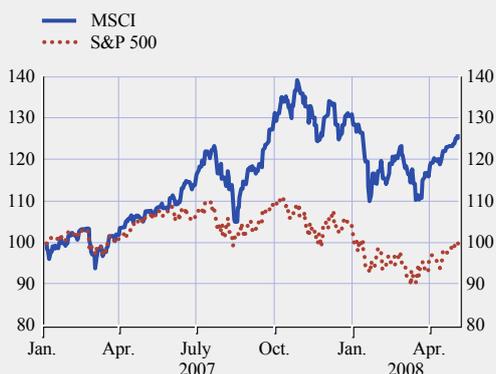
(Jan. 1998 – May 2008; basis points)



Sources: JPMorgan Chase & Co and ECB calculations.

**Chart 1.22 Recent evolution of the MSCI and S&P 500 equity indices**

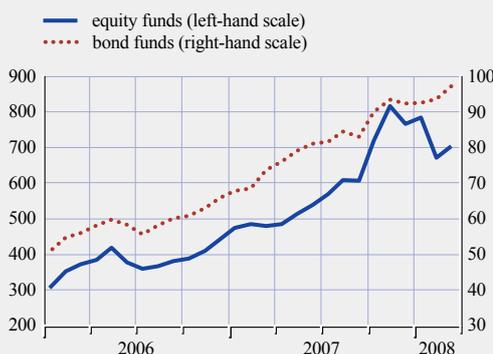
(Jan. 2007 – May 2008; Jan. 2007 = 100)



Sources: Bloomberg and ECB calculations.  
Note: The indices are in domestic currency.

**Chart 1.23 Assets under management of dedicated emerging market economy funds**

(Jan. 2006 – Mar. 2008; USD billions)



Source: EPFR Global.

The observed correction was initially driven by rising global risk aversion and declines in valuations in equity markets in emerging Asia (notably China). Since February, however, increasing concerns about the real implications of the global market turmoil have at least partly contributed to sell-offs over a broad spectrum of emerging economy financial assets. In line with this, in early May EMBIG spreads stood at three-year highs of 270 basis points (see Chart 1.21), while price-earnings ratios in emerging equity markets became more comparable to those of mature equity markets.

Notwithstanding the possibility of “re-coupling” embedded in recent market developments (see Chart 1.22),<sup>11</sup> by early May emerging market equity valuations, supported by gains in commodity-exporting economies, remained close to levels reached prior to the financial turbulence, unlike those in mature economies. Moreover, emerging international bond markets also remained relatively resilient, with EMBIG spreads standing 180 basis points below spreads on similarly-rated BB US corporate bonds.

In this context, dedicated emerging market equity funds saw significant outflows in the

months following the finalisation of the last FSR in line with the ongoing global reappraisal of risk (see Chart 1.23). Assets managed by dedicated emerging market bond funds continued to grow, however, underscoring the persistent interest from international investors in the asset class.

Evidence as to whether carry trades involving emerging economy currencies reappeared after the financial market turbulence remains mixed. Emerging economy currencies like the Brazilian real presumably remained attractive for carry trades on account of rising commodity prices.

Looking ahead, developments since the last FSR have shown that emerging market economy financial assets, while showing resilience, remain also potentially vulnerable to spikes in global risk aversion as well as to real and financial market developments in mature economies. Emerging financial markets therefore remain a source of market risk for euro area financial institutions.

<sup>11</sup> For instance, the correction in the MSCI index from early November to early March (about 13%) was comparable to that of the S&P 500.

Box 3

RECENT DEVELOPMENTS IN CHINESE EQUITY MARKETS

The marked increase in valuations in Chinese equity markets between early 2006 and the autumn of 2007 and the correction that occurred after the finalisation of the last FSR have given rise to financial stability concerns about the potential consequences of a bubble burst. While implications for euro area financial stability should not be overstated, this box reviews recent developments in Chinese equity markets, as they have attracted significant attention since the publication of the last FSR.

From January 2006 to its peak in October 2007 the main Chinese equity market index in local currency (the “Shanghai A-share” index) rose by nearly 425%. In 2007 alone it almost doubled. Reflecting rising concerns about a possible market overvaluation, price-earnings (P/E) ratios of Chinese equities were comparable in October 2007 to those of Japanese equities in the late 1980s and of US equities in 2002, when bubbles in those markets burst (see Chart A). In addition, the increase in P/E ratios was widely distributed among Chinese firms and sectors, which could be also interpreted as a further sign that valuations were stretched. In this context, the index corrected sharply, by around 40% between October 2007 and April 2008 (see Chart B).

These developments should be seen against the background of the structural characteristics of the Chinese stock markets. As a consequence of the ongoing financial sector reforms, Chinese equity markets tend to be small, not very liquid and largely closed to foreign investors. Regarding size, stock markets accounted for less than 40% of GDP at the end of 2007, against 210% of GDP for domestic banking sector assets. Only a small fraction of Chinese (mainly state-owned) companies are listed. Retained earnings and, to a lesser extent, bank loans are the main sources of financing of firms. Regarding liquidity, only a small proportion of shares of listed firms are actively traded (around 25%), while the rest is generally held by public entities and is not allowed to be traded. Moreover, the development of derivatives is still in a stage of infancy.

Chart A Comparisons of selected episodes of “overvaluation”



Sources: Bloomberg and CEIC.

Chart B Recent evolution of the Shanghai A share market



Source: CEIC.

**Chart C Recent evolution of selected equity indices**

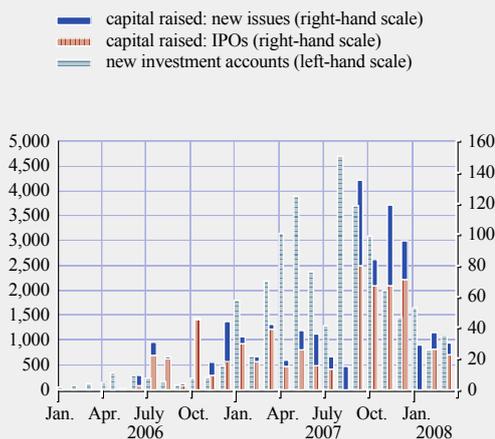
(index: 9 August 2007 = 100)



Source: Bloomberg.

**Chart D Capital raised and securities deposits opened by Chinese firms and households**

(RMB billions)



Source: CEIC.

In terms of openness, foreign investment is strictly regulated through quotas in local currency markets or confined to the foreign currency equity markets (the “B-shares markets”), which are even smaller and more illiquid. All in all, overseas investment represented less than 5% (less than USD 40 billion) of tradable shares as at end-2007. Therefore, stock price developments have traditionally been accounted for by domestic determinants.

Several factors explain the increase in stock market valuations after 2006. Among the structural factors, Chinese authorities have introduced market-oriented regulations since 2005, including provisions to facilitate capital raising and IPOs by firms and provisions that allowed the gradual conversion of non-tradable shares into tradable ones. Transparency of listed companies and better corporate governance has also been encouraged. Moreover, high profitability of listed companies and strong expectations about Chinese economic growth also underpinned the rally in stock prices until the autumn of 2007. Non-structural factors were also at play, including ample domestic liquidity, negative interest rates on deposits, and the lack of alternative financial assets, all of which contributed to shifting an increasing proportion of private savings into equity markets.<sup>1</sup> Relative market illiquidity and obstacles to arbitrage further tended to make prices sensitive to demand changes.<sup>2</sup> Finally, investors’ perception of implicit government protection and the lack of a financial culture are believed to have possibly blurred investment risk assessments.

Notably, since the start of the financial turmoil last year, Chinese equity market performance has tracked foreign market developments more closely (see Chart C). Return correlations, albeit remaining low, have also increased. This seems to have triggered the correction in valuations as reflected also by a change in expectations and behaviour among Chinese firms and savers. Firms are scaling back the magnitude of capital raisings and IPOs, while the number of securities

1 As reflected in, for example, the premium paid in China for those companies listed simultaneously on the mainland and in Hong Kong.

2 The Chinese government raised its concerns about the price rally and attempted to dampen it through measures such as raising taxes on equity transactions and reducing the tax burden on incomes related to bank deposits. The authorities have also tried, with little success, to encourage domestic capital outflows.

deposit accounts opened has significantly declined and the balance of existing accounts has begun to shift to risk-free deposits (see Chart D). In the context of a languishing market in April 2008, Chinese authorities limited the tradability of recently converted tradable shares and reduced taxes on equity transactions.

### FOREIGN EXCHANGE MARKETS

A substantial appreciation of the euro characterised the period after the finalisation of the December 2007 FSR, in a context of increased uncertainty (see Chart 1.24). Some moderation in the strengthening of the single currency took place in the last days of April and in the first week of May.

In nominal effective terms the appreciation of the euro in the first five months of 2008 was also sizeable (see Chart 1.25), with a tendency to weaken seen primarily against the currencies employed in carry trade operations, i.e. the Japanese yen and the Swiss franc and, more significantly, vis-à-vis the currencies of some of the new EU Member States.

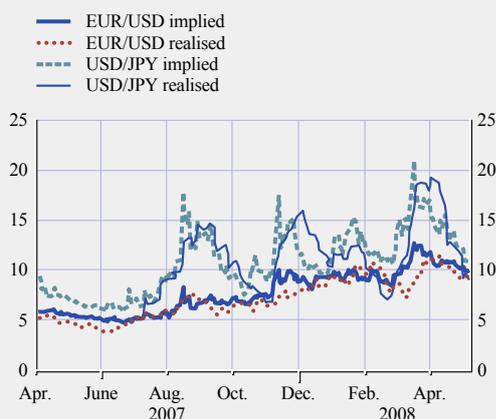
The unwinding of speculative positions against the Japanese yen after the peak in July 2007 continued in parallel with a rapid repricing of financial risk. Similarly, market positioning against the US dollar declined sharply in the first months of 2008, reaching an almost neutral level in April.

Shifts in the appetite of investors for foreign exchange risk materialised in a context of rapidly rising uncertainty about future exchange rate levels, as indicated by rising differentials between implied and realised volatilities of swap rates (see Chart 1.26).

Looking ahead, risk reversals – quantifying market expectations of the balance of risks

**Chart 1.24 Implied and realised volatility of the EUR/USD and JPY/USD nominal bilateral exchange rates**

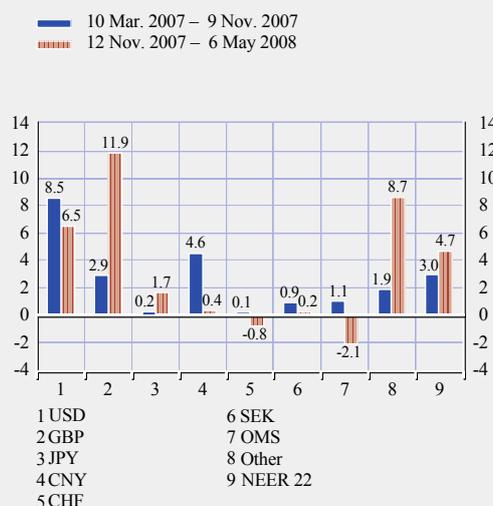
(Apr. 2007 – May 2008; %)



Source: Bloomberg.  
Note: Volatilities refer to a one-month horizon.

**Chart 1.25 Changes in the bilateral exchange rate of the euro vis-à-vis selected groups of currencies and periods**

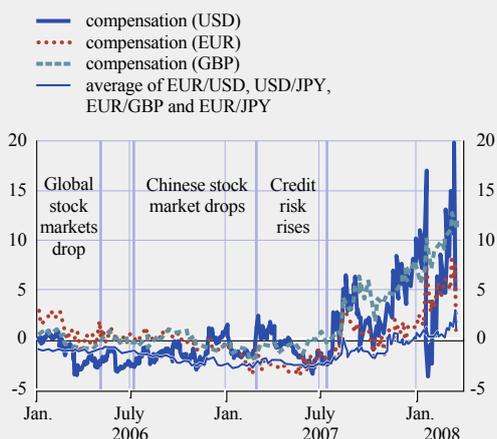
(Mar. 2007 – Nov. 2007 and Nov. 2007 – May 2008)



Source: ECB.  
Note: NEER 22 is the nominal effective exchange rate vis-à-vis the 22 largest trading partners of the euro area. The category “other Member States (OMS)” refers to the aggregate contribution of the currencies of the non-euro area Member States (excluding the GBP and SEK). The category “other” refers to the aggregate contribution of the remaining six trading partners.

**Chart 1.26 Differential between implied and realised volatilities of swap rates for different currencies and currency options**

(Jan. 2006 – Mar. 2008; %)



Sources: Bloomberg and ECB calculations.

in future movements in bilateral exchange rates – indicated increasing expectations of a weakening euro vis-à-vis the US dollar between the end of October 2007 and mid-February 2008 (see Chart 1.27). After a short period in which investors returned to a neutral position with regard to future exchange rate levels, expectations moved again in favour of the

US dollar after mid-March. Over longer horizons, i.e. 12 and 24 months, the expectations for the EUR/USD rate have been rising, from about USD 1.35 prevailing until the end of 2007 to slightly over USD 1.40 last March (source: Consensus Economics).

### COMMODITY MARKETS

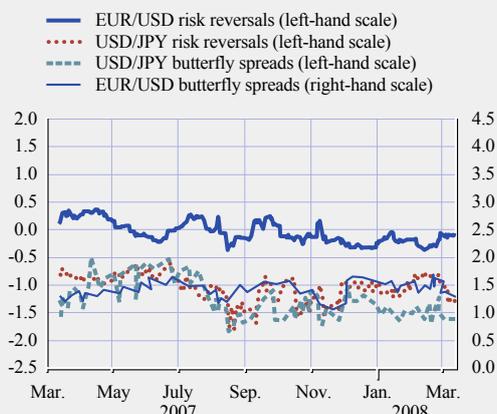
Oil prices increased sharply amid very high volatility following the finalisation of the last FSR, supported by tighter macroeconomic fundamentals and investment uncertainty amid the market turmoil.

As regards the fundamentals, global oil demand growth has remained relatively robust due to strong demand growth in non-OECD countries. Non-OPEC supply growth continues to fall short of expectations, causing oil inventory levels to decline. As regards the role played by speculation, hedge fund activity in crude markets remained at very high levels, with speculators positioned net long already since March 2007 with increasingly high and volatile positions (see Chart 1.28).

Looking ahead, oil futures prices remain at elevated levels and exhibit high volatility,

**Chart 1.27 Risk reversals and butterfly spreads for the EUR/USD and the JPY/USD exchange rates**

(Mar. 2007 – Mar. 2008)



Source: Bloomberg.  
Note: Risk reversals and butterfly spreads are the prices of portfolios long in some options and short in others. All such options have a one-month maturity.

**Chart 1.28 Speculative positions on oil futures and oil prices**

(Jan. 2006 – Apr. 2008, net future commitments of non-commercials on the New York Mercantile Exchange)



Source: Bloomberg.  
Note: Net commitment = number of long - number of short contracts, where each contract represents 1,000 barrels. "Non-commercials" denotes entities not engaged in crude oil production or refining.

**Chart 1.29 Option-implied risk-neutral densities of oil prices**

(Jan. 2005 – Dec. 2008; USD per barrel; 10%, 20%, 50%, 80% and 90% confidence intervals of estimations on 8 May 2008)



Sources: Bloomberg and ECB calculations.

reflecting expectations of dynamic oil demand growth in emerging markets and restricted oil supply growth. However, the risk surrounding this outlook remains considerable, as indicated by the implied distributions for future oil prices, as derived from options contracts (see Chart 1.29).

The price of non-energy commodities continued on a steep upward trend at the end of 2007 and in early 2008. Metals prices in particular increased strongly in 2008 on concerns over supply shortages and despite recent worries about the global economic outlook. Gold and the amount of gold in exchange-traded funds (ETFs) benefited from safe-haven inflows and

**Chart 1.30 Price of gold and amounts in exchange-traded funds (ETFs)**

(Jan. 2004 – May 2008)



Sources: Bloomberg and Exchange Traded Gold.

growing investor interest after the finalisation of the December 2007 FSR (see Chart 1.30).

### 1.3 CONDITIONS OF GLOBAL FINANCIAL INSTITUTIONS

#### GLOBAL LARGE AND COMPLEX BANKING GROUPS<sup>12</sup>

The turmoil that had originated in the US sub-prime mortgage market and which subsequently cascaded through the global financial system led to a sustained deterioration in the operating environment for global large and complex banking groups (LCBGs). In the six months after the finalisation of the last FSR, conditions initially worsened as losses on sub-prime mortgages and securities backed by them, combined with disruptions in wholesale money markets and illiquidity in structured credit markets, led to more severe mark-to-market losses. This subsequently magnified pre-existing concerns of clients and investors about the liquidity and solvency positions of US securities firms, which led to the eventual takeover of one US securities firm by a US LCBG in March 2008.

As noted in the December 2007 FSR, funding costs faced by global LCBGs remained elevated as investors demanded higher premia for credit risk in response to heightened counterparty credit risk, with continued uncertainty concerning the possible magnitude of further losses that may be incurred on sub-prime, structured credit and other contingent exposures. Furthermore, upward pressure on funding costs was also driven by the potential need to provide liquidity support to off-balance-sheet structures and the need to fund assets such as leveraged buyout (LBO) loans on the balance sheet that would, ordinarily, have been distributed into the secondary market.

<sup>12</sup> For a discussion on how global large and complex banking groups are identified, see Box 10 in ECB (2007), *Financial Stability Review*, December. The institutions included in the analysis are Bank of New York-Mellon, Barclays, Citigroup, Credit Suisse, Goldman Sachs, HBOS, HSBC, JPMorgan Chase & Co., Lloyds TSB, Merrill Lynch, Morgan Stanley, Royal Bank of Scotland, State Street, UBS and Wachovia. However, not all figures were available for all companies.

Reflecting the impact of the market turmoil on global LCBG performance in the second half of the year, their average return on equity decreased to around 11% in 2007 from just over 21% in 2006 (see Chart 1.31). For those financial statements of global LCBGs covering the first quarter of 2008 that had been published before the cut-off date of this FSR, there were indications that the ongoing turbulence continued to have a significant impact on their financial performances, primarily due to further losses related to the structured credit markets.

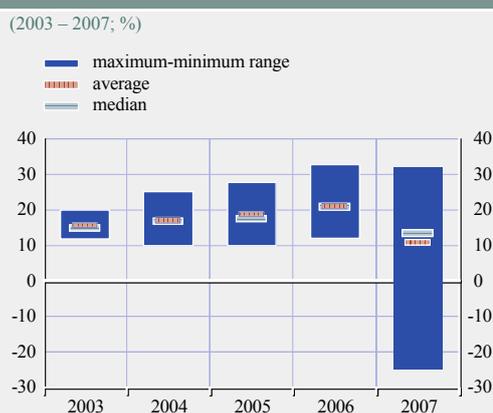
Various sources of income for global LCBGs were affected differently in 2007. Fees and commissions from market-making, prime brokerage, hedge-fund servicing and asset management activity contributed to a rise in the average ratio of fee and commission income to shareholders' funds, from just under 25% in 2006 to just under 30% in 2007.

For global LCBGs with substantial investment banking franchises, sources of growth in fee income included debt underwriting associated with LBO activity, as well as equity underwriting, particularly in emerging markets. For some banks, fee income from structuring and distributing various types of credit products was also important, particularly over the past few years. The impact of the turmoil was felt more acutely by institutions with significant operations in this business.

Regarding the supply of structured credit products, it is more than likely that the spread widening observed in credit markets (see Section 1.2) detrimentally affected the economics of some types of structured credit transaction. More specifically, both the cost of financing these transactions and the increased expected losses on the underlying collateral increased markedly after July 2007.

On the demand side, structured investment vehicles (SIVs) were very large purchasers of the various tranches of securitised credit products and financial institution debt. As the turmoil, and the associated spread widening,

Chart 1.31 Return on equity for global large and complex banking groups



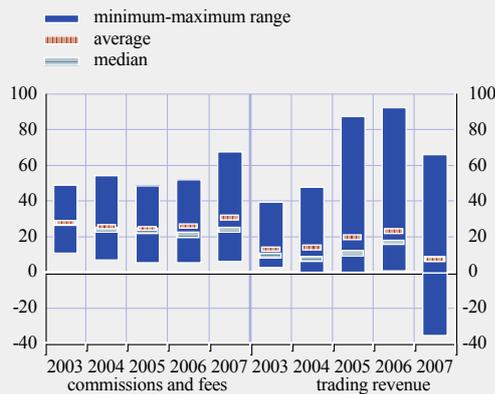
Sources: Individual institutions' financial reports and ECB calculations.

have affected the economic viability of SIVs and other structures, it is likely that global LCBGs will generate significantly less revenue from this part of the structured credit markets in the short to medium term.

Trading income remained an important source of revenue for many LCBGs in 2007, although the effects of the turbulence during the second half of the year could clearly be seen in the full-year results. Expressed as a percentage of shareholders' equity, average trading revenues decreased sharply from just over 22.8% in 2006 to about 7.3% in 2007 (see Chart 1.32). Moreover, the degree of dispersion among institutions of this source of revenue became wider, and in some cases negative, for a variety of institution-specific reasons related to the turmoil. In some instances, this was due to proprietary trading difficulties experienced by some in-house hedge funds as a result of the sub-prime episode and the associated financial turmoil; in others, it was due to the worsening of conditions in various parts of the global credit markets. Finally, some institutions experienced large declines in trading revenue as a result of having large concentrated risk positions in sub-prime collateral or CDOs based on sub-prime collateral dating from late 2006 and 2007. The performance of these securities – including dramatically higher

**Chart 1.32 Fee and commission revenues and trading revenues for global large and complex banking groups**

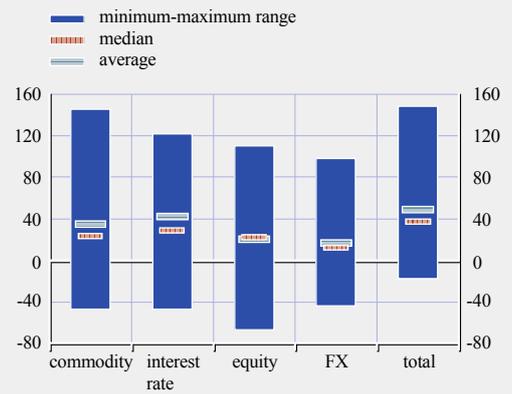
(2003 – 2007; % shareholder equity)



Sources: Individual institutions' financial reports and ECB calculations.

**Chart 1.33 Change in value-at-risk levels as a percentage of shareholders' equity for global large and complex banking groups**

(2006 – 2007; % change)



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

Note: VaR is calculated at a 99% confidence interval and a holding period of ten days or scaled up to a ten-day period.

default rates, and ultimately significant ratings downgrades – was considerably poorer than that of earlier vintages. More positively for trading revenues, the increase in volatility observed in financial markets, such as equity and commodity markets, and in currencies had some offsetting effects on overall revenues for certain institutions.

After the finalisation of the December 2007 FSR, the trading value-at-risk (VaR) numbers published by these institutions continued to display diverse patterns. To the extent that published VaR numbers can provide some indication of market risks, some global LCBGs increased their market risk exposures towards commodities and equities, while others reduced positions in various credits and exposures to more volatile markets and widening spreads. On an overall basis, the total VaR of these institutions increased in 2007 compared with 2006. This was mainly because volatility increased as the effects of the sub-prime disturbance cascaded through various markets (see Chart 1.33 and Table S2).

Aside from being a financial risk that is not adequately captured in VaR, the degree of illiquidity that affected the markets for various types of credit assets held for trading purposes

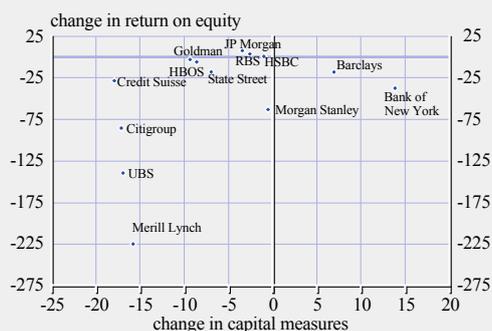
led to significant valuation changes affecting the net income of these institutions. Comparing 2007 with 2006, certain institutions experienced significant declines in profitability as well as declines in capital measures associated with the turbulence (see Chart 1.34). Some commentators and institutions have gone as far as to argue that fair value accounting practices exacerbated the turmoil as they affected institutions profit and loss accounts and capital by lowering retained earnings.

In any considered assessment of the role of fair value or mark-to-market/mark-to-model accounting, several points should be noted.<sup>13</sup> First, it should be recalled that many institutions made significant gains that were recorded in net income over the past three years or so from trading in structured credit as credit spreads on these instruments became extremely tight regardless of how they were priced. On the face of it, therefore, it seems asymmetric to suggest that reporting losses at fair value should be suspended simply because markets have not

<sup>13</sup> For a detailed discussion of fair value accounting from financial stability perspective, see A. Enria et al. (2004), "Fair value accounting and financial stability", ECB Occasional Paper No. 13.

**Chart 1.34 Change in return on equity and capital measures for global large and complex banking groups**

(2006 – 2007; % change)



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

Note: For large US securities firms, the capital measure is equity to total adjusted assets; for all other firms the Tier 1 capital ratio is used.

moved favourably for some of the institutions concerned.

A more balanced view of marking to market could consider the often overlooked fact that all of these institutions continually mark assets to market internally when determining appropriate risk concentration and other trading limits, as well as valuing collateral taken in various business transactions such as prime brokerage activities. The suspension of the practice of marking to market in these areas (entailing increasing margin requirements based on deteriorating prices) would most probably not be countenanced by most financial institutions.

More importantly, mark-to-market (or in some instances mark-to-model) accounting can actually lead to better awareness and management of risk. For example, when it is applied rigorously, it can lead to the effective identification and analysis of institution-wide risk positions, including off-balance-sheet positions. Furthermore, it is notable that institutions that had well-defined, consistent, and robust means of valuing risk positions and making the changing valuation of those positions known to senior management of the firms concerned appeared to have incurred less concentrated risk positions and lower valuation losses on securities than firms that did not.

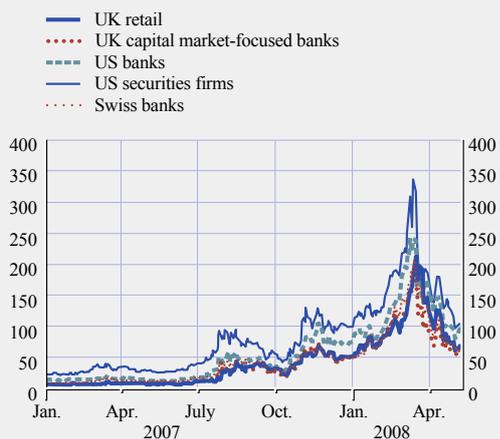
While a widespread and pernicious cycle of marking down assets to model or market is not conducive to systemic risk reduction, it is important to remember that mark-to-market accounting is not the underlying cause of the current turbulence. Mark-to-market or mark-to-model accounting is a point in time estimate of what the seller could sell the asset for, excluding distressed sales, which is explicitly ruled out under IFRS accounting. However, the inherent assumption under fair value accounting that the intrinsic value of the asset is always reflected in the market price may not always coincide with the fair value reflected during market turmoil.

That being said, disclosures of how individual LCBGs are marking illiquid assets to model differ significantly in terms of the details provided, and more focused disclosure in this particular area is needed. Furthermore, it could also be argued that the recent turmoil in credit markets has meant more effective and meaningful disclosure is required not just by LCBGs but also by financial institutions globally to mitigate the severe effects that a lack of knowledge of exposures and a lack of confidence in the valuation of these exposures have had on the global financial system.

These effects – including the initial impact and amplification of the sub-prime episode through various parts of credit and equity markets – have been quite pronounced on market indicators. Credit default swap (CDS) spreads on the debt of LCBGs initially widened on the basis of investor concern about exposure to sub-prime mortgages (see Charts 1.35 and S13). There was also some evidence of variation in spreads depending on the investor perception of credit risk due to the differing types of banking and brokerage activity undertaken, along with perceptions of the various firms' access to liquidity. Overall, CDS spreads for this group widened after the start of the turbulence, and widened sharply further towards the end of 2007. In early 2008 they widened further and subsequently narrowed

**Chart 1.35 Credit default swap spreads for global large and complex banking groups**

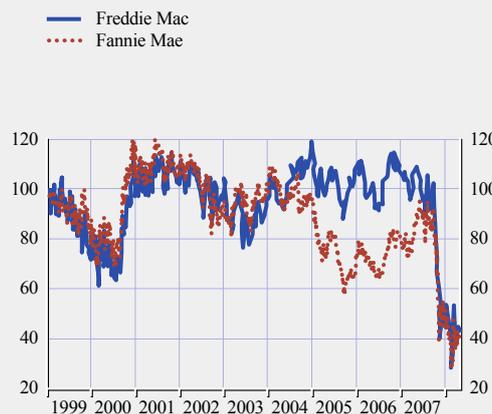
(Jan. 2007 – May 2008; basis points)



Sources: Bloomberg and ECB calculations.  
 Note: UK retail = HBOS and Lloyds TSB; UK capital market = RBS, Barclays, HSBC; US banks = Wachovia, JPM Chase, Citigroup; US securities firms = Goldman Sachs, Merrill Lynch, Morgan Stanley; Swiss banks = UBS and Credit Suisse.

**Chart 1.36 Equity prices of Fannie Mae and Freddie Mac**

(Jan. 1999 – May 2008; index: Jan. 1999 = 100)



Sources: Bloomberg and ECB calculations.

in conjunction with the action of the Federal Reserve in March 2008.

Looking ahead, unless structured credit markets reopen in a meaningful manner and funding costs retrench somewhat, it is likely that continued impairment of the functioning of these markets will force global LCBGs to retain these assets and write down their value further. While this may be compensated for somewhat by diversifying business to emerging markets and commodities, in the short to medium term earnings of global LCBGs will suffer a significant decline, and it cannot be ruled out that additional capital raising may be needed.

#### GOVERNMENT SPONSORED ENTERPRISES

In terms of factors that may positively affect the operating environment of global LCBGs, one development of note has been the easing of regulatory capital restrictions on the two main US government sponsored enterprises (GSEs) – Fannie Mae and Freddie Mac – by their regulator, the Office of Federal Housing Enterprise Oversight (OFHEO). In particular, the reduction in their required holding of

excess regulatory capital by 20%, combined with commitments by the institutions to raise additional capital themselves, as well as some other related developments, should improve the secondary market for certain types of mortgage in the United States.

However, these enterprises are also facing additional valuation change write-downs on their existing holdings of mortgages of various credit qualities and associated financial instruments, combined with the negative effects of conditions in the US residential property market. Looking forward, given their importance for the US and global financial systems, the possibility of deteriorating financial conditions among these institutions could cause concern for financial stability. Such considerations could also have been a factor in the recent depression in the share prices of the two largest GSEs (see Chart 1.36).

#### MAJOR GLOBAL INSURERS

The financial condition of some global insurers domiciled outside the euro area can be important for the stability of the euro area financial system, mainly because of their importance

as large asset managers with the potential to affect financial markets, their presence as underwriters in the euro area insurance and securities markets and their role in mitigating risks to the extent they have reinsured euro area insurers or reinsurers.

### Major global primary insurers and reinsurers

Global primary insurers and reinsurers have thus far in general weathered the credit market turmoil relatively well thanks to generally limited exposures to the structured credit products that fell in value after the summer of 2007. Some large global insurers did, however, report significant losses for the latter part of 2007 and in the first quarter of 2008 that were caused by the credit market turmoil.

Most prominently, the US insurer American International Group (AIG) reported a combined net loss for the fourth quarter of 2007 and the first quarter of 2008 of USD 13 billion due to USD 30 billion of write-downs and losses related to US sub-prime mortgage market exposures during the same period.

In Europe, the world's largest reinsurer Swiss Re announced a USD 1.15 billion write-down shortly after the finalisation of the December 2007 FSR and a further USD 778 million write-down for the first quarter of 2008 on structured credit default swap transactions. These losses were reported to be caused by an isolated event and profits for 2007 as a whole were strong but declined by 53% in the first quarter of 2008 compared to the same period in 2007.

All in all, financial market turmoil-related losses for major global primary insurers and reinsurers have in general been manageable. However, losses for some institutions led to reduced capital buffers and in some cases a need to raise new capital. These losses and the in some cases significant exposures to structured credit products (not only those referencing US sub-prime mortgages) suggest that these institutions could face significant

losses should the current challenging credit market environment worsen.

### “Monoline” financial guarantors

Financial guarantors (also referred to as “bond insurers” or “monolines”) became a major focus of attention shortly after the finalisation of the December 2007 FSR when their capital positions were severely impaired by losses caused by the credit market turmoil. Although some market participants had questioned the structured finance insurance business model of financial guarantors for some time before the problems surfaced and potential risks facing the sector had been identified in previous issues of this FSR,<sup>14</sup> the magnitude of the problems and propagation channels through which they spread surprised many market participants and public authorities.

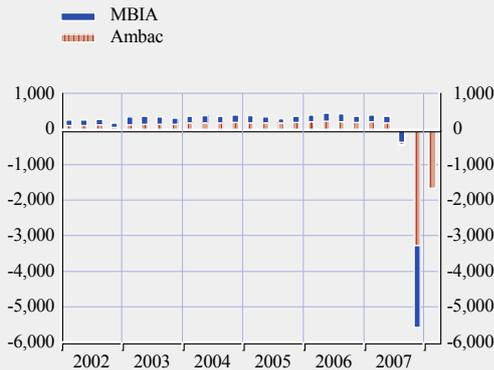
Financial guarantors sell protection against default of investment-grade debt securities (see Box 4 for an explanation of financial guarantors' business model). Due to the turmoil in credit markets – and in particular structured credit markets, where guarantors had sold protection mainly in the form of credit default swaps – most financial guarantors suffered large mark-to-market losses during the fourth quarter of 2007 and the first quarter of 2008. For example, Ambac and MBIA, the two largest financial guarantors, reported a combined loss of USD 5.6 billion for the fourth quarter of 2007 after a more modest loss of USD 400 million in the third quarter of 2007. These losses were comparable to the sum of steady income earned by these institutions during the previous four years. At the time of finalisation of this FSR, Ambac had reported a further USD 1.7 billion loss for the first quarter of 2008 (see Chart 1.37).

Because of the large losses, most financial guarantors had to receive capital injections from parent institutions or other investors or raise capital in financial markets to maintain their

<sup>14</sup> See ECB (2007), *Financial Stability Review*, June.

**Chart 1.37 Net income of Ambac and MBIA**

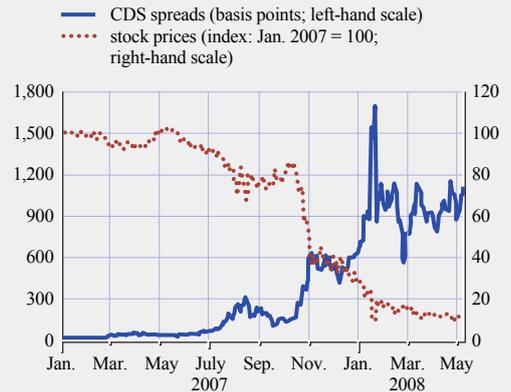
(Q1 2002 – Q1 2008; USD millions)



Source: Bloomberg.  
Note: Q1 2008 data for MBIA were not available at the time of finalisation of this FSR.

**Chart 1.38 Credit default swap (CDS) spreads and stock prices for Ambac and MBIA**

(Jan. 2007 – May 2008; averages)



Source: Bloomberg.

ratings or to avoid any large-scale downgrades by rating agencies.<sup>15</sup> Some were downgraded, however, which in turn affected the securities they had insured, resulting in mark-to-market losses for institutions, often banks, which had bought credit protection.

The great uncertainty surrounding the financial guarantors after the finalisation of the December 2007 FSR put severe pressure on their stock prices, and their CDS spreads soared to levels that implied ratings far worse than not only the actual ratings but also the sub-investment-grade benchmark (see Chart 1.38). These indicators have yet to recover, reflecting the view of market participants that the financial guarantor sector is still facing an uncertain outlook.

The business model of insuring against the default of structured credit products has been questioned by market participants and some believe that it has a limited future. In any event, the shrinkage of global structured credit markets will have negative implications for financial guarantors' revenue going forward. The outlook for the municipal bond insurance business is expected by market participants to be somewhat brighter, although many challenges remain.

To sum up, the outlook for the financial guarantors remains uncertain, and should the problems in the sector remain, or indeed worsen, the knock-on effects for financial institutions and markets – and thereby for euro area financial stability – could be significant.

<sup>15</sup> Many financial guarantors also cancelled dividend payouts and announced that they would stop underwriting structured credit products for the time being.

## Box 4

**“MONOLINE” FINANCIAL GUARANTORS: THE BUSINESS MODEL AND LINKAGES WITH FINANCIAL INSTITUTIONS AND CAPITAL MARKETS**

One of the sectors worst affected by the turbulent credit market environment after the summer of 2007 is the financial guarantor sector (also referred to as “bond insurers” or “monolines”). Large credit spread increases, coupled with rating downgrades on structured credit products against the default of which the financial guarantors had sold protection, caused large mark-to-market losses for most financial guarantors, which weakened their capital positions. The capital shortfalls led to a questioning of the ratings of the financial guarantors (often AAA-rated), and guarantors that were not able to raise new capital were downgraded by rating agencies. The rating downgrades of some financial guarantors led to rating downgrades and value losses for the securities that they had insured. These developments rippled through parts of the financial system and capital markets through both direct and indirect channels. This box describes the financial guarantor business model and how the problems in the sector spread to other parts of the financial system and to capital markets (more recent developments and the outlook for financial guarantors is discussed in Section 1.3).

The defining characteristic of financial guarantors is their involvement in one insurance business only, the insurance against default of investment-grade debt securities (hence the label “monoline insurer”). In bond insurance the financial guarantors typically guarantee to provide continuity of payments (principal and interest) should the bond issuer default. In structured credit product insurance, the financial guarantor provides a “wrap” for the issue and/or protection for individual holders mainly via credit default swaps (CDSs).

The financial guarantors’ business model is reliant on the guarantors’ own high credit ratings (often AAA), which they achieve by only insuring high-grade securities which were deemed unlikely to default *en masse*. Financial guarantors usually enhance the credit rating of securities issues to AAA (or in some cases AA or A) by substituting their credit risk for the risk of the instruments they insure, thereby ensuring lower-cost placements for bond and structured credit product issuers and better liquidity for investors. It is the issuing company or public entity that issues a bond or structured credit product that arranges the insurance and pays the insurance premium to the financial guarantor.

The first financial guarantors were established in the early 1970s and only insured municipal bonds (debt obligations issued by states, cities, counties and other governmental entities) in the United States. Since then the sector has grown to include about a dozen companies and has remained domiciled in the United States (with subsidiaries in Europe and elsewhere), although most now also insure securities issued outside the United States. The value of securities insured by financial guarantors at the end of 2006 was about USD 2.4 trillion (par value). Although insuring municipal bonds remains the main business of most financial guarantors, with USD 1.4 trillion (par value) insured at the end of 2006 (about half of all US municipal bonds carry a financial guarantor guarantee), many have increasingly been providing protection on structured credit products such as asset-backed securities (ABSs) and collateralised debt obligations (CDOs), with an insured par value of USD 612 billion in the United States and USD 212 billion internationally (see Figure). However, since 2004 ABSs have accounted for more than half of all new business.

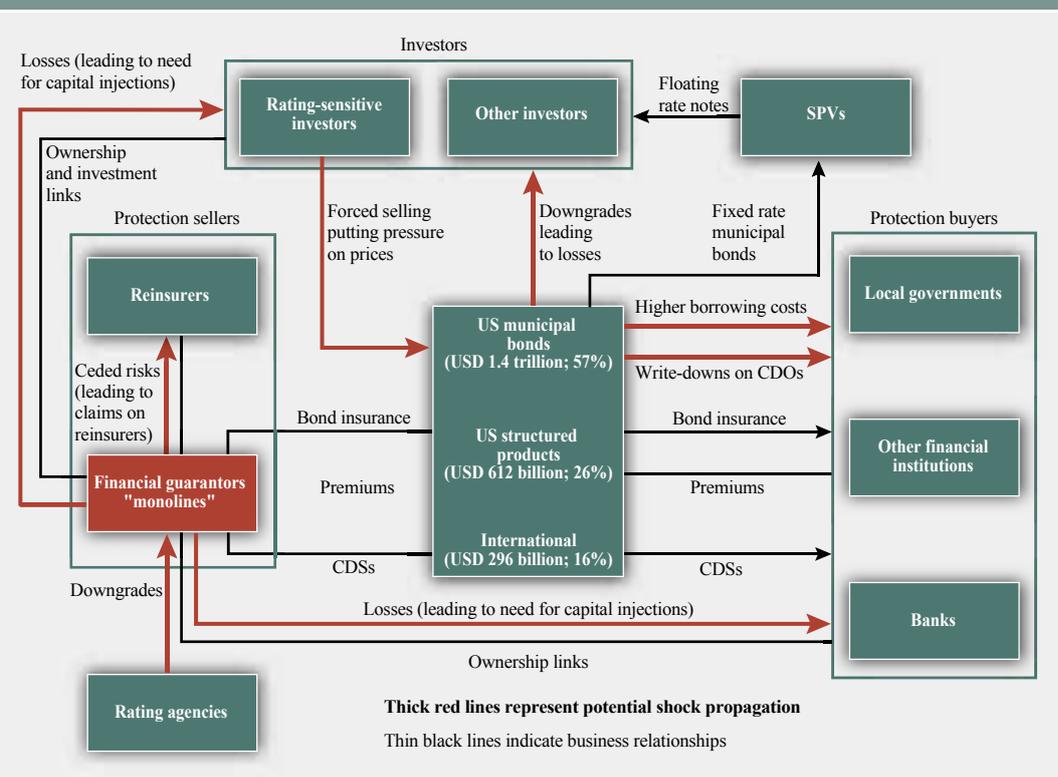
The large losses recorded by most financial guarantors in recent quarters were caused by exposures to CDSs that reference underlying obligations on credit products affected by the market turmoil. This was due to the fact that financial guarantor contracts, including those executed via CDSs, have to be marked to market, with the unrealised gains and losses being recorded through the income statement.

There are several propagation channels through which the problems faced by financial guarantors have and could spread further through the financial system and affect financial institutions and capital markets in the euro area (see Figure below).

i) Securities issuers, such as banks, that have bought credit protection from financial guarantors on, for example, CDOs they have arranged have had to face write-downs since these “hedges” lost value when the ratings were downgraded. These rating downgrades and the fact that most financial guarantors have stopped writing insurance on structured finance products have led to higher borrowing costs on structured credit products for protection buyers such as banks. The same problems have affected municipal bond issuers and have already caused municipal bond auction failures and funding difficulties for municipal bond programmes.

ii) Investors, and in particular rating-sensitive investors such as banks, insurers and municipal-bond mutual funds, can be adversely affected by losses and rating downgrades of financial guarantors if they are holding securities whose rating is sensitive to the insurance (or “wrap”)

### Linkages to financial guarantors in the financial system



provided by a financial guarantor. These investors face mark-to-market losses and an increase in regulatory capital charges because the lower-rated securities will attract a higher capital requirement. To the extent that investors, due to regulatory requirements, are only allowed to hold high-rated securities, securities downgrades can also cause forced selling by such investors, putting further pressure on the prices of municipal bonds, structured credit products and other securities insured by financial guarantors. In addition, banks that sponsor funds that have invested in securities insured by guarantors might also face reputation risks if the funds were to experience large losses.

iii) Losses by financial guarantors and their need to restore capital bases have also affected, and could further affect, some euro area banks and other companies that own financial guarantors and have provided capital injections. Most prominently, Dexia owns Financial Security Assurance (FSA) and Caisse d'Épargne and Banque Populaire together own CIFG after taking it over from their jointly owned investment bank Natixis by injecting USD 1.5 billion in capital.

iv) Euro area reinsurance companies could face losses if they have reinsured the business of financial guarantors. Thus far, however, such losses have been limited.

To sum up, the main concern from a euro area financial stability viewpoint regarding the financial guarantors' problems are risks of losses for euro area banks and insurers/reinsurers (to the extent that they have exposures – both direct and indirect – to the financial guarantors and securities guaranteed by them) and of further possible knock-on effects in the broader bond and structured credit markets.

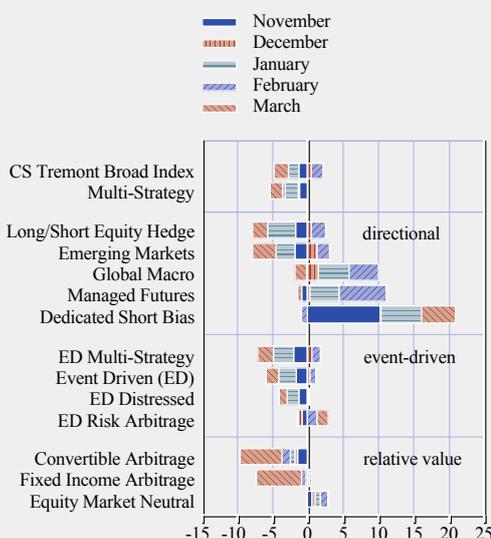
### HEDGE FUNDS

After the December 2007 FSR was finalised, the situation in the hedge fund sector deteriorated significantly with many sub-sectors of the industry enduring substantial losses (see Charts 1.39 and 4.22). Cumulative average returns for the whole sector over the period from November 2007 to March 2008 were in the lowest decile of historical returns, generated using all possible investment dates and holding periods of a theoretical investment in the broad non-investable hedge fund index (see Chart 1.40). In March 2008, the average monthly returns of convertible and fixed income arbitrage hedge funds were respectively the worst and the second worst in history and close to those after the near-collapse of the Long-Term Capital Management (LTCM) hedge fund.

Moreover, some credit-focused hedge funds have contributed while many others have been seriously hit by a self-reinforcing downward spiral of price declines in credit markets. Losses

Chart 1.39 Global hedge fund returns

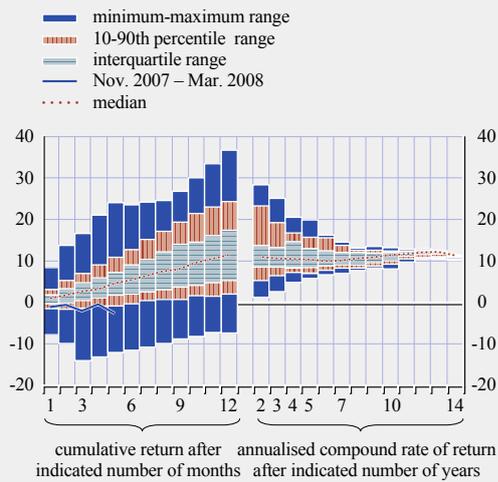
(Nov. 2007 – Mar. 2008; % monthly returns net of all fees in USD)



Source: Credit Suisse Tremont Index.

**Chart 1.40 Distribution of historical global hedge fund returns by investment holding period**

(Jan. 1994 – Mar. 2008; % monthly returns net of all fees in USD)



Sources: Credit Suisse Tremont Index and ECB calculations.  
Note: Credit Suisse Tremont Broad Index. Distributions are generated using all possible investment dates and investment holding periods up to March 2008.

on leveraged and concentrated investment portfolios of credit positions (market risk) led to margin calls by banks and redemption requests by investors (funding liquidity risk), prompting forced sales and deleveraging and thereby leading to further price falls and associated mark-to-market losses (again market risk). In many cases this constituted a nearly perfect storm scenario and caused a series of failures of credit-oriented hedge funds or led to the suspension of investor withdrawals.

Some of these failed hedge funds had to mark down the value of various high-grade debt securities due to falling prices, sometimes without any apparent deterioration in the underlying credit quality, whereas others were sidelined by premature contrarian buying of seemingly undervalued debt assets. In most cases, however, high leverage, tighter refinancing terms introduced by banks and the lack of diversification proved to be important factors behind the demise of these credit-focused hedge funds.

In the period ahead, the risk of additional selling pressure from hedge funds in credit and other

asset markets will depend upon their exposures, leverage and funding liquidity strains.

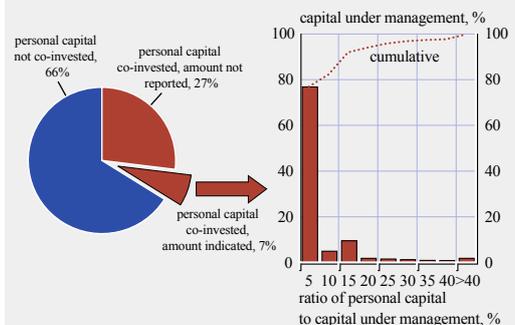
### Exposures

Up until early 2008 the relative resilience of the hedge fund sector, after widespread losses in August 2007, had been a surprise for many observers. The lack of large exposures to US mortgage-backed securities had been frequently mentioned by market intelligence as a most likely explanation and this was partly confirmed by information reported by hedge funds on their investment focus to one commercially available hedge fund database (see Table 1.1 in the December 2007 FSR).

Other reasons that were put forward included a much narrower and therefore more specialised investment scope than that of banks allowing more focused risk management approaches and the alignment of hedge fund managers' incentives with those of investors due to the co-investment of their own money. Whereas the former argument might often prove to be true, the latter practice of joint ownership of the hedge fund's capital under management does not seem to be as widespread as is often claimed (see Chart 1.41).

**Chart 1.41 Co-investment of personal capital by hedge fund managers**

(June 2007; % of capital under management)



Sources: Lipper TASS database and ECB calculations.  
Note: 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 this dataset, total reported capital under management of single-manager hedge funds amounted to USD 639 billion.

Based on information in one hedge fund database, only about one-third of single-manager hedge funds (as measured by capital under management) reported that their managers had co-invested personal capital in the hedge fund. This could be partly due to the growing share of institutional hedge funds with perhaps a somewhat less common co-investment practice.

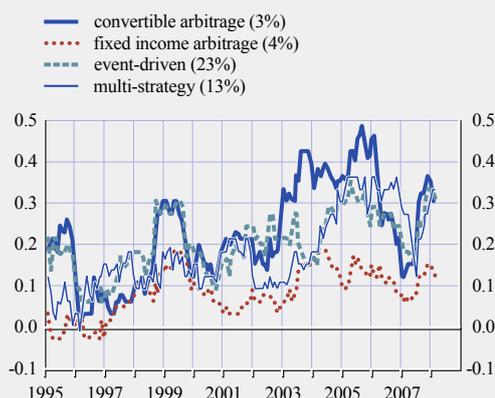
In spite of all these explanations, hedge funds did not manage to avoid negative returns in November 2007 and early 2008. Many hedge funds found it difficult to navigate through increasingly volatile financial markets, despite the widespread belief that volatility is good for hedge funds, since it provides more opportunities to earn so-called alpha or excess returns. It is noteworthy, however, that higher volatility also increases the risk of mistakes being made.

Based on comments by market practitioners that can also be supported by a closer inspection of recent hedge fund investment performance results (see Chart 1.39), hedge funds pursuing global macro, short-selling and managed futures investment strategies tend to be long volatility due to the nature of their directional investment strategies. By contrast, many credit-oriented and “relative-value” or “arbitrage” hedge funds typically produce stable positive returns most of the time, but exhibit a non-negligible tail risk of extreme negative returns.

Correlations across individual hedge fund returns within various hedge fund investment strategies could be used to gauge the possible similarity of hedge fund investment exposures. Since the summer of 2007 median pairwise correlations have been increasing within all credit-related strategies shown in Chart 1.42, suggesting that there was some crowding of hedge fund trades within these strategies and that the risk of an abrupt collective unwinding of such trades increased. However, since it was a stressful period for many hedge funds, higher correlations could have also been due to similar actions taken by a limited number of major

**Chart 1.42 Medians of pairwise correlation coefficients of monthly hedge fund returns within strategies**

(Jan. 1995 – Mar. 2008; Kendall's  $\tau$  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 2007, 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.

prime brokers which forced hedge funds to deleverage at around the same time.

### Leverage and funding liquidity risk

In addition to investment and funding liquidity risks, leverage represents another very important interlinked endogenous vulnerability for hedge funds. It is the reason and the source of funding liquidity risk associated with short-term financing provided by banks or related to margin-based trading in OTC derivatives markets and organised exchanges. Hence, high leverage not only boosts investment risk, but it also makes a hedge fund dependent on the stability of funding provided by banks and investors. Margin calls, inability to roll over margin loans, investor redemptions, as well as losses on a highly leveraged investment portfolio that are small in percentage terms but, nevertheless, high in absolute value and non-negligible as a percentage of capital under management, would all prompt immediate forced sales and the deleveraging of an investment portfolio

with potential adverse implications for affected financial markets.

The use of leverage is also an important feature that distinguishes hedge funds from traditional investment funds and makes them substantially similar to banks. However, the leverage of a hedge fund is rarely comparable to or as high as that of a bank.

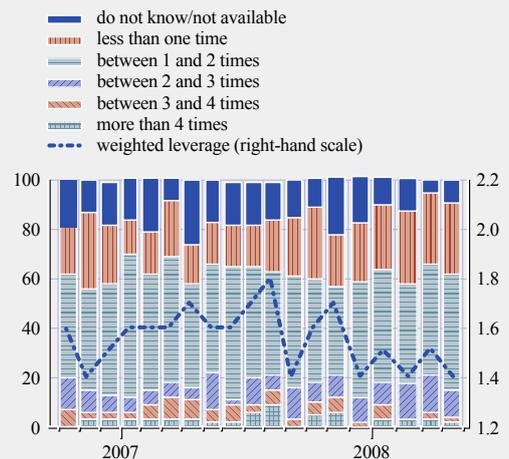
Some available time-series data on hedge fund leverage seem to support the view that hedge fund leverage has probably declined and remained low since the finalisation of the December 2007 FSR (see Chart 1.43). While some deleveraging might have taken place at the initiative of hedge fund managers who deliberately opted to keep their leverage low amid difficult market conditions, it was also due to the further tightening of lending terms by banks (see also Section 4.2). Increased margin requirements and margin calls led to some forced unwinding of leveraged trades across credit-focused hedge funds and, reportedly, even contributed to the eventual closure of some of those hedge funds. The lower availability of leverage may pose some difficulties for hedge funds that rely on leverage to produce desired returns and may also limit the ability of hedge funds to buy assets at distressed prices and thereby to provide a stabilising influence on market prices.

A large part of forced or voluntary deleveraging has probably already occurred, so the risk of further selling pressure may have declined since the finalisation of the December 2007 FSR. Nonetheless, as can be seen from Chart 1.43, hedge funds' use of leverage is very dynamic and subject to both banks' credit terms and market conditions.

Moreover, based on the same data, changes in leverage seem to be pro-cyclical and asymmetric with respect to the sign of investment returns, since investment losses were associated only with reductions in the leverage ratio (see Chart 1.44). In addition, the largest reductions occurred either after investment

**Chart 1.43 Hedge fund leverage**

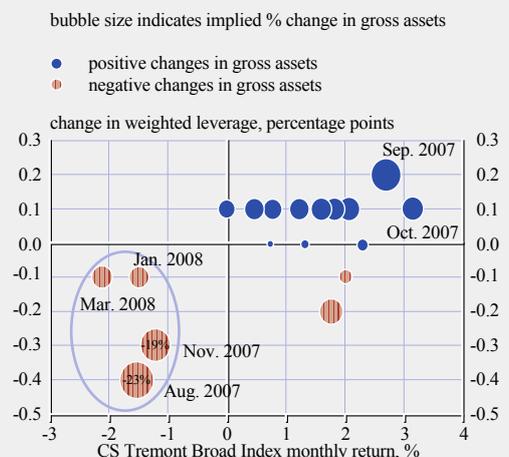
(Oct. 2006 – Apr. 2008; % of responses and weighted average leverage)



Source: Merrill Lynch, *Global Fund Manager Survey*.  
 Note: Leverage is defined as a ratio of gross assets to capital. The data collection for the survey took place during the first two weeks of each calendar month, so responses most likely refer to the beginning of each month or the end of the previous month. The number of responses varied from 33 to 45.

**Chart 1.44 Hedge fund returns and changes in leverage and gross assets**

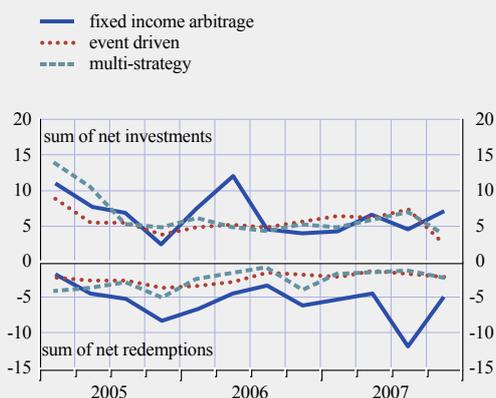
(Oct. 2006 – Mar. 2008; %, monthly returns net of all fees in USD; percentage points, change in weighted leverage)



Source: Merrill Lynch, *Global Fund Manager Survey*, Credit Suisse Tremont Index and ECB calculations.  
 Note: Leverage is defined as a ratio of gross assets to capital. Implied change in gross assets (A) is equal to:  $A^{new}/A = (\text{capital}^{new}/\text{capital}) \times (\text{leverage ratio}^{new}/\text{leverage ratio}) = (1 + \text{return}/100) \times (\text{leverage ratio}^{new}/\text{leverage ratio})$ .

**Chart 1.45 Hedge fund aggregate quarterly net redemptions and net investments by strategy**

(Q1 2005 – Q4 2007; % of capital under management at the end of previous quarter)



Sources: Tremont Capital Management, Lipper TASS and ECB calculations.

Notes: For every quarter, net redemptions refer to the sum of outflows of managers suffering net outflows and net investments refer to the sum of the inflows of managers receiving net inflows, each divided by the strategy's total capital under management at the end of previous quarter.

losses or when the starting level of the leverage ratio was already relatively high.

It is also noteworthy that in the case of positive returns the leverage ratio decreases automatically, whereas after investment losses even the restoration of the previous leverage ratio would necessitate asset liquidations owing to the matching decline in the value of both a hedge fund's investment portfolio (numerator) and its capital under management (denominator). As shown in Chart 1.44, such position liquidations can sometimes be quite large and may have a significant impact on asset prices and market liquidity.

Regarding funding liquidity risk stemming from investor redemptions, it should be noted that investor aggregate net flows remained positive and quite strong in the second half of 2007 (see Charts S15 and S16),<sup>16</sup> despite some slowdown across most strategies during the last quarter of 2007 and concerns mentioned in the previous edition of the FSR that investors might rush to withdraw their money owing to the market turmoil and poor investment performance results. Nevertheless, these concerns remain valid and are

even stronger than before due to less favourable hedge fund performance results since the finalisation of the December 2007 FSR and more cautious views on the global financial outlook among investors.

Notwithstanding positive aggregate net flows, there were some notable redemption pressures across hedge funds within the fixed income arbitrage strategy. Aggregation of hedge funds that experienced net inflows or net outflows separately suggests that, amid strains in credit markets, investor redemption activity and associated funding liquidity risks were quite high for fixed income arbitrage hedge funds during the third quarter of 2007 (see Chart 1.45).

### Liquidations

The frequency of news about hedge fund failures, hedge fund closures or the suspension of investor redemptions has clearly gone up in 2008, and this has prompted sometimes quite pessimistic views on the state of the hedge fund sector. However, these views are difficult to substantiate with available aggregate data on hedge fund launches and cases of attrition.

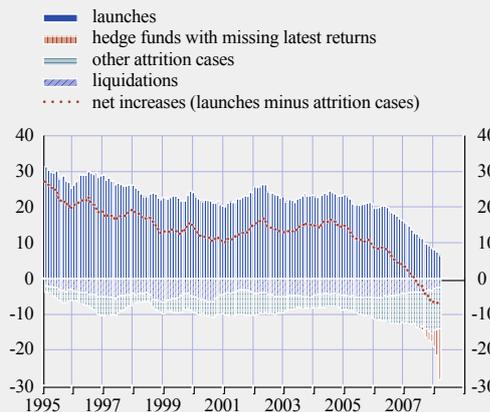
Data on global hedge fund launch and attrition rates, including cases of liquidation, which are available in one commercial database, are presented in Chart 1.46. Since recent data are subject to incomplete reporting and new hedge funds joining the database backfill their historical information, more reliable estimates of launch and attrition rates are those indicating the situation that existed at least two to three years ago. Nevertheless, recent patterns of declining launch rates and quite high rates of other attrition cases since late 2006 may indicate developments that will not disappear from the data even after several years.

There are at least two important factors that may have an adverse impact on the viability

<sup>16</sup> Based on data compiled from 11 hedge fund databases, single-manager hedge funds managed around USD 2.1 trillion of investors' capital at the end of 2007. See PerTrac Financial Solutions (2008), "2007 PerTrac Hedge Fund Database Study", 4 March (press release).

**Chart 1.46 Global hedge fund launch, liquidation and attrition rates**

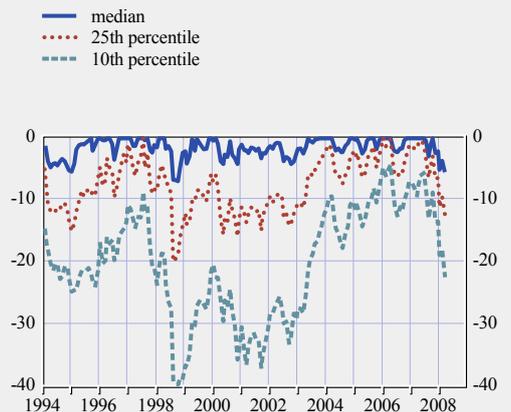
(Jan. 1995 – Mar. 2008; 12-month moving sum and the number of funds with missing latest returns as % of existing funds 12 months previously)



Sources: Lipper TASS database and ECB calculations.  
 Note: 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, unknown. Cases of liquidation or other attrition are assumed to have taken place during the month following last reported returns. The most recent data are subject to incomplete reporting and information can be added to or modified continuously. Historical launch rates are therefore likely to increase as new hedge funds join the database and backfill their historical information. This should also lower the absolute values of liquidation and other attrition rates.

**Chart 1.47 Distribution of hedge fund drawdowns**

(Jan. 1994 – Mar. 2008; % monthly returns net of all fees in fund's reporting currency)



Sources: Lipper TASS database and ECB calculations.  
 Note: 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. The most recent data are subject to incomplete reporting.

of some hedge funds. First, at the end of March 2008 many single-manager hedge funds suffered substantial draw-downs relative to their previous peaks of cumulative returns due to weak latest performance results (see Chart 1.47). Nevertheless, not all hedge funds apply high-watermark provisions, which stipulate that incentive fees are paid only if cumulative returns recover any past shortfalls, and therefore could benefit sooner from an improvement in returns in the period ahead.

Second, weak recent returns may also contribute to higher liquidation rates due to the specifics of hedge fund manager compensation contracts. Quite often incentive fees are accrued throughout the year, but paid out only once at the end of the financial year. This partly explains why hedge fund liquidations tend to increase in January after the amount of incentive fees has been

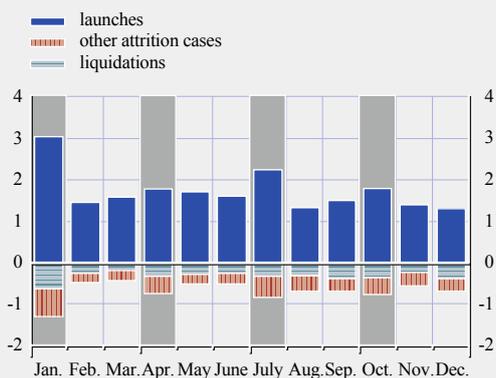
determined based on returns in the preceding year (see Chart 1.48). Weak year-to-date returns in 2008 mean that the prospects of receiving any incentive fees are lower and may encourage some hedge fund managers to discontinue their operations, particularly in those cases where incentive fees account for a large share of all fee income.

Liquidations, as well as other attrition cases, also tend to increase after the end of each quarter (see Chart 1.48). This is most likely due to the higher impact of redemption activity, since monthly and quarterly redemptions coincide for a large number of hedge funds.

To sum up, hedge funds have been undergoing a challenging period and it is not clear yet in what shape they will resurface after the market turmoil subsides. With the exception of larger

**Chart 1.48 Seasonality of global hedge fund launch, liquidation and attrition rates**

(Jan. 1995 – Dec. 2007; % of existing funds at the end of the previous month; medians)



Sources: Lipper TASS database and ECB calculations.

Note: 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. Cases of liquidation or other attrition are assumed to have taken place during the month following the last reported returns.

investor redemptions, which, however, may still materialise, most other endogenous vulnerabilities of hedge funds, including investment risk, leverage and the stability of bank funding, have resulted in serious difficulties for many hedge funds. Some leveraged credit-focused hedge funds have been particularly badly hit. Moreover, many hedge funds still remained vulnerable to tougher lending stances of prime brokers and a further deterioration in financial markets. Further deleveraging and forced sales in credit and other asset markets cannot therefore be excluded.



## 2 THE EURO AREA ENVIRONMENT

The overall macroeconomic environment in the euro area has remained relatively stable over the past six months. However, reflecting the turmoil that has gripped the global financial system since mid-2007 and the potential for a downturn in global demand, the risks to the overall macroeconomic outlook for the euro area increased after the finalisation of the December 2007 FSR. This could lead to a contraction of credit availability to households and firms. Nevertheless, the balance sheets of households and firms remain sound in general, although risks in commercial property markets in particular have started to materialise.

### 2.1 ECONOMIC OUTLOOK AND RISKS

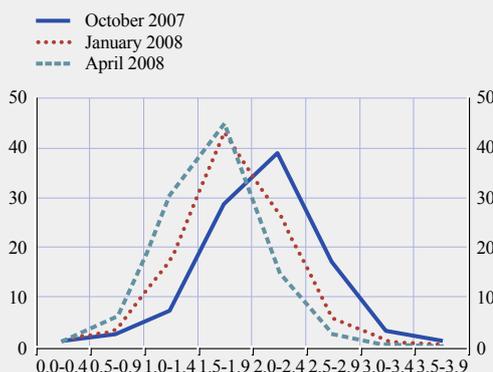
Macroeconomic conditions have a direct bearing on the ability of households and companies to honour their financial obligations. A sudden worsening in the macroeconomic environment can therefore be an important exogenous source of risk to financial stability. However, the macro environment can also be a source of imbalances that build up endogenously over a period of time. As Box 5 discusses, analysis of the macro economy also focuses on identifying and understanding these possible structural fault lines that could sow the seeds of future crises.

After the finalisation of the December 2007 FSR, growth in the euro area moderated and the outlook deteriorated. Year-on-year GDP growth fell to 2.2% in the fourth quarter of 2007 from 3.2% a year earlier (see Chart S43). Declining consumption growth and a moderation in investment contributed to the slowdown in growth. External demand remained more robust overall but expanded at a slower pace. Surveys showed that business and household confidence fell sharply during the second half of the year and in the early months of 2008 following the financial turmoil – although they remained consistent with ongoing growth.

Looking ahead, the central outlook for growth has weakened, although it remains positive. ECB

Chart 2.1 Forecasts for euro area GDP growth in 2008

(probability distributions for year-on-year GDP growth in 2008; %)



Source: ECB Survey of Professional Forecasters.

staff macroeconomic projections published in March pointed to real GDP growth in a range between 1.3% and 2.1% in 2008 and between 1.3% and 2.3% in 2009.<sup>1</sup> Compared with earlier forecasts, both ranges had been revised downwards, reflecting a less supportive global outlook and less favourable prospects for domestic demand, largely related to the combined effects of the financial turmoil and of strong increases in commodity prices. These projections were broadly in line with external forecasts, which had also revised down expectations for growth in 2008 (see Chart 2.1).

The risks to the outlook for growth related to a sharper downturn in global demand, higher than expected commodity prices and indirect taxes. Concerns also remained about the potential for an accelerated and disorderly unwinding of global imbalances, or a further repricing of risks, which could lead to a contraction of credit availability to households and firms. Overall, the likelihood of these risks materialising remained relatively small. The fundamentals of the euro area economy remain sound and, as discussed in Box 5, the economy does not suffer from major imbalances. Private sector assessments of the

<sup>1</sup> Eurosystem staff macroeconomic projections based on information available until late May will be published in the June 2008 issue of the ECB Monthly Bulletin.

probability of low growth had risen slightly after the December 2007 FSR but remained low (see Chart 2.1 and Chart S44). Nevertheless, in the light of the continuing financial turmoil,

uncertainty about the prospects for economic growth is unusually high and the risks to the stability of the financial system have increased slightly over the past six months.

## Box 5

### THE MACROECONOMIC ENVIRONMENT AND FINANCIAL STABILITY: EVIDENCE FROM PAST BANKING CRISES

The macroeconomic environment can be an important factor underlying the stability of the financial system, affecting the creditworthiness of firms and households, the buoyancy of financial markets, and the profitability and stability of financial institutions. As a corollary, the macroeconomic environment can also be an important exogenous source of risk for financial stability: an adverse shock – or constellation of shocks – can directly impair households' and firms' ability to honour their financial obligations. It may also be an indirect source of imbalances that build up endogenously over time. Although the form of such vulnerabilities varies – including excessive investment, debt accumulation, rapidly rising asset prices, or widening current account deficits – the mechanism tends to be similar. It is usually associated with a misperception of future returns or risk that leads to an inter-temporal misallocation of resources and a build-up of imbalances that weakens the resilience of the system to future adverse disturbances.

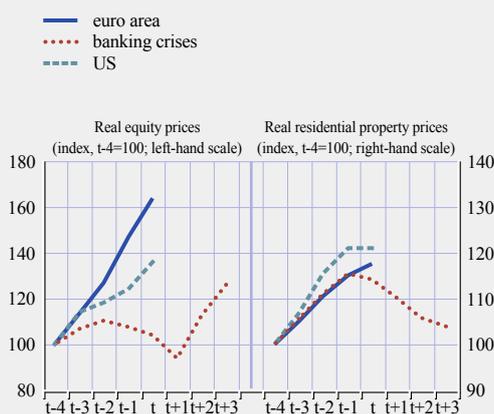
In practice, the challenges of identifying such vulnerabilities *ex-ante* can be significant. Theory may not offer ready answers, for example, in distinguishing when a credit expansion has become a credit boom. In some instances, these vulnerabilities are evident only in retrospect. Given those challenges, a growing body of literature has looked at past banking crises in an attempt to identify a common set of fault lines in episodes of financial distress.<sup>1</sup> This box draws on some of that research and assesses the current state of the euro area against those past experiences.

One approach in the literature is to use past episodes to highlight a set of stylised facts across countries experiencing financial distress. A recent example is provided by Reinhart and Rogoff (2008) who find qualitative parallels across a number of indicators in countries experiencing banking crises.<sup>2</sup> A comparison of banking crises in advanced economies over the past three decades suggests that developments follow the same broad path in the years prior to a crisis: rapidly rising home and equity prices, acceleration in capital inflows, a sustained debt accumulation and, shortly before the crisis hits, slowing economic growth. Reinhart and Rogoff analyse the current situation of the United States, which in recent years has also experienced a large accumulation of debt, rapid increases in asset prices and persistent current account deficits (see Charts A and B). In contrast to the United States, the euro area does not reveal such consistent similarities, but it nonetheless highlights some of the potential vulnerabilities for the euro area which have been commented on in this and previous FSRs. As discussed in Section 3, in common with asset prices

1 One example is ECB (2005), "Indicators of financial distress in mature economies", *Financial Stability Review*, June.

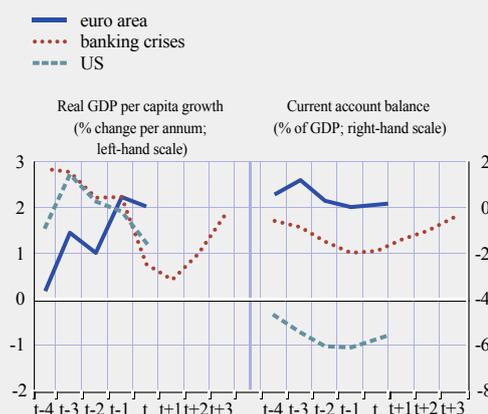
2 C. Reinhart and K. Rogoff (2008), "Is the US sub-prime financial crisis so different? An international historical comparison", National Bureau of Economic Research Working Paper No. 13761, January 2008. C. Detken and F. Smets (2004), "Asset Price Booms and Monetary Policy" in H. Siebert (ed.), *Macroeconomic Policies in the World Economy*, Springer: Berlin, and R. Adalid and C. Detken (2007), "Liquidity shocks and asset price boom/bust cycles", ECB Working Paper No. 732, analyse asset price boom/bust episodes, which are in many cases associated with banking crises. See also C. Goodhart and B. Hoffman (2008), "House prices, money, credit and the macroeconomy", ECB Working Paper No. 888, for similar evidence.

**Chart A** Recent developments in US and euro area real equity prices and real residential property prices compared with past banking crises



Sources: OECD, IMF and ECB calculations based on national data. Note: The indicators are deflated by consumer prices. For the United States and the euro area, period t represents 2007. For the average of past banking crises, period t represents the year of onset of the financial crisis.

**Chart B** Recent developments in US and euro area real GDP growth and current account balances compared with past banking crises



Sources: Eurostat and ECB calculations. Note: For the United States and the euro area, period t represents 2007. For the average of past banking crises, period t represents the year of onset of the financial crisis.

internationally, euro area equity indices had broadly risen until the onset of financial turmoil in 2007. And, as described elsewhere in Section 2, while aggregate euro area residential property price growth moderated recently, residential property prices in the euro area have also shown strong increases, similar in scale to past episodes of financial instability (see Chart A).

A more quantitative approach attempts to use these stylised facts as potential early warning indicators. Borio and Lowe (2002) assessed the potential for developments in asset prices and credit to provide quantitative indications of the accumulation of possible structural vulnerabilities.<sup>3</sup> As macro-financial vulnerabilities tend to build up over an extended period, rather than analysing developments in a particular year, this approach focused on cumulative processes. Vulnerabilities are identified by examining the “gap” or deviation of the credit-to-GDP ratio and equity prices from a “trend”.<sup>4</sup> Balancing the need for an indicator which will identify a high proportion of crises while also minimising the number of false alarms, Borio and Lowe examine these “gaps” during past crisis periods and select thresholds – either for each indicator individually or in combination – which, when breached, may provide a useful signal about the current potential for financial turmoil over a specified horizon.<sup>5</sup>

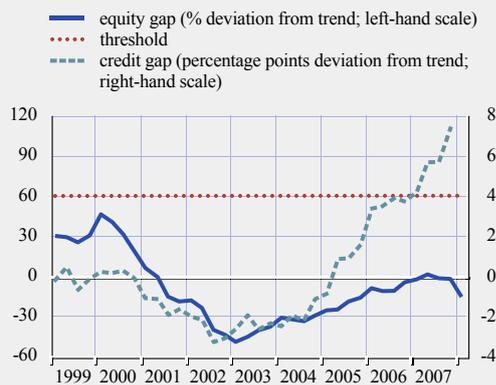
As highly reduced form and summary measures, with no explicit modelling of the links between macroeconomic imbalances and financial instability, and a crude statistical definition of “trend”, these indicators have limitations. They are perhaps best considered as one element

3 C. Borio and P. Lowe (2002), “Asset prices, financial and monetary stability: exploring the nexus”, BIS Working Paper No. 114; and C. Borio and P. Lowe (2004), “Securing sustainable price stability: should credit come back from the wilderness?”, BIS Working Paper No. 157.

4 The trend is estimated recursively using an Hodrick-Prescott filter on quarterly data (using a setting of lambda, the parameter that controls the smoothness of the series, equal to 400,000 to capture a smoothed trend). A broader indicator of asset price imbalances would incorporate property prices, which have historically played a role in banking crises, but owing to data limitations, Borio and Lowe rely exclusively on equity prices.

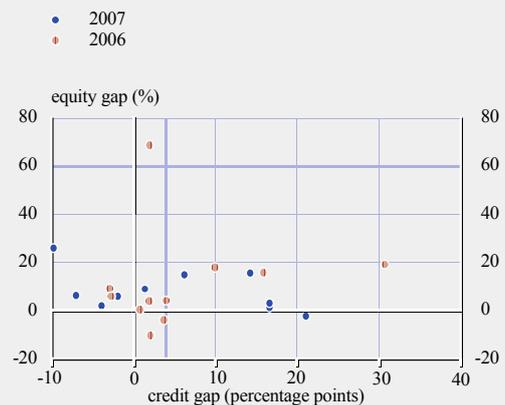
5 Borio and Lowe consider horizons ranging from three to five years. Adalid and Detken (2007) have a similar approach and find that consumer price deflated growth in housing prices and M3-based liquidity shocks explain GDP growth following asset price booms. The stronger the accumulated growth in real estate prices and monetary liquidity, the worse the following recession.

**Chart C Credit and equity “gaps” for the euro area**



Sources: IMF and ECB calculations.  
 Note: The indicators show deviations of the private credit-to-GDP ratio and real equity prices from ex-ante, recursively calculated Hodrick-Prescott trend. For information on thresholds (60% for the equity “gap” and 4 percentage points for the credit “gap”), see Borio and Lowe (2002 and 2004).

**Chart D Credit and equity “gaps” in selected euro area countries**



Sources: IMF and ECB calculations.  
 Note: The indicators show deviations of the private credit-to-GDP ratio and real equity prices from ex-ante, recursively calculated Hodrick-Prescott trend. Each point represents a euro area country.

of the qualitative process which compiles a summary assessment of overall vulnerabilities. Nevertheless, in particular by combining individual indicators, they represent a means of considering different aspects of potential macroeconomic imbalances with implications for financial stability. Encouragingly for the euro area, the prognosis from these indicators is relatively good – with only tentative indications of possible vulnerabilities building up in the euro area. Although since the start of 2007 the ratio of credit to GDP in the euro area has risen above the threshold “warning” level (Chart C), real equity prices remain more subdued. They have risen in the past four years, but that followed a long period of decline after the bursting of the tech bubble of the late 1990s, and equity prices remain – on this measure – close to trend. Of course, this aggregate picture masks differences across countries, but, as Chart D shows, while several euro area countries have seen widening credit “gaps” and some others a rapid increase in equity prices, no country has registered warnings in both indicators.

## 2.2 BALANCE SHEET CONDITION OF NON-FINANCIAL CORPORATIONS

Most available indicators suggest that the balance sheets of euro area firms remained reasonably strong after the finalisation of the December 2007 FSR. To date, firms seem to have been able to weather the intensified financial market turbulence and deteriorating macroeconomic outlook rather well.

Looking ahead, risks for the corporate sector have increased during the past six months. In particular, financing costs and leverage have

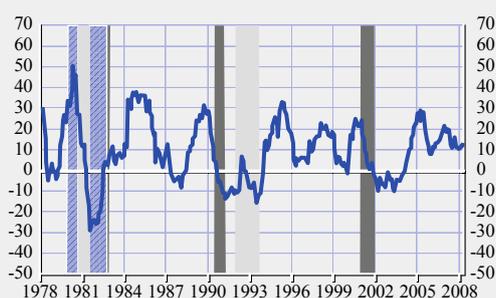
continued to edge up over the past six months. There are also indications that the peak of the earnings cycle may have been reached, suggesting that firms may experience problems absorbing further shocks to their balance sheets.

### EARNINGS OUTLOOK

Non-financial firms in the euro area have been able to weather the current financial market turmoil rather well so far. Part of this resilience is linked to the fact that their profitability has remained exceptionally strong over the past few years, which in turn has contributed to a strengthening of their balance

**Chart 2.2 Annual earnings growth of euro area non-financial corporations and recession periods in the United States and the euro area**

(Jan. 1978 – May 2008; % change per annum)

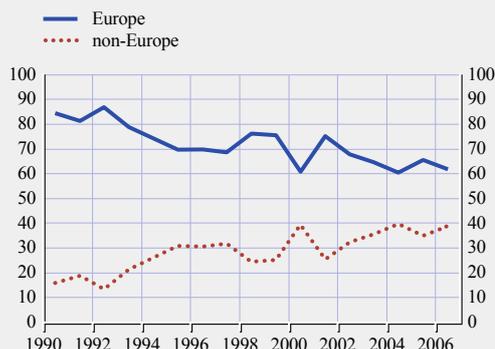


Source: Thomson Financial Datastream.

Note: Light grey areas correspond to economic recessions in the euro area (as defined by the Centre for Economic Policy Research, CEPR). Dark grey areas correspond to economic recessions in the United States (as defined by the National Bureau of Economic Research, NBER). The areas with diagonal stripes represent periods with common economic recessions, as defined by the CEPR and the NBER respectively. The earnings series is computed by multiplying the price index by the inverted price-earnings ratio.

**Chart 2.3 Euro area firms' income generated within and outside Europe**

(1990 – 2006; % of total)



Sources: Thomson Financial Datastream and ECB calculations.

Note: The operating income data for Dow Jones EURO STOXX 50 firms are sorted according to the geographical segmentations as provided to Thomson Financial Datastream.

sheets. There are, however, recent indications that the euro area corporate earnings cycle may have reached its peak. In order to assess the robustness of recent earnings performances, a useful starting point is to compare recent profitability performances with those observed during previous business cycles. As reported in Section 2.1, it should be noted that after the finalisation of the December 2007 FSR, growth in the euro area moderated and the outlook beyond 2008 has deteriorated. In general, given the commonalities between corporate earnings growth and GDP growth, it may be expected that periods of economic slowdown could also have a dampening impact on the profitability of euro area firms (although, in principle, the causality can work in both directions) (see Chart 2.2).<sup>2</sup> In addition, given the strong financial and economic linkages between the euro area and the United States, a drop in economic activity in the United States may also influence the earnings of euro area firms negatively.

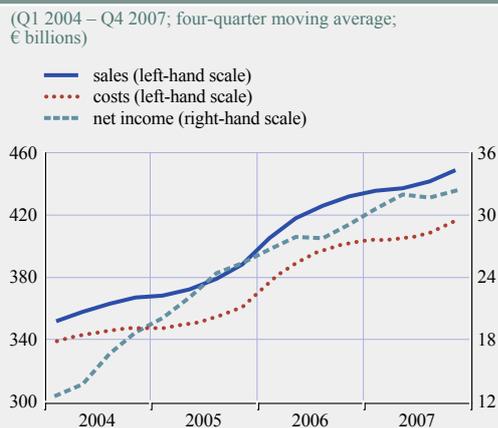
Two notable features emerge from Chart 2.2. First, domestic economic recessions usually do not bode well for the profitability of euro area non-financial firms. Indeed, the protracted euro

area recessions in the early 1980s and 1990s coincided with relatively sharp drops in the profitability of non-financial firms. Second, the profitability of euro area firms also trended downwards during periods when the US and euro area economies decoupled (i.e. periods when the United States dipped into recession and the euro area economy managed to avoid a prolonged economic downturn). Thus, going forward, it is likely that the expected slowdown in US economic growth in 2008 could also have a dampening impact on the profitability of euro area firms.

The degree to which the earnings of euro area firms may be influenced by a sharp slowdown in economic activity in the United States is, however, difficult to assess. One way to gauge potential spillover effects is to note that euro area firms' earnings generated abroad have indeed gained in importance over the past

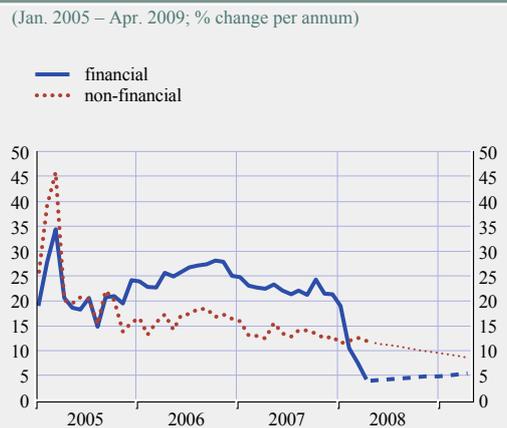
<sup>2</sup> For more details of the empirical linkages, see Box 5 in ECB (2007), *Monthly Bulletin*, September. Although informative, any interpretation of the derived earnings series should be treated with some caution as negative earnings observations are excluded by the data provider. As a result, the derived earnings measure could be biased upwards.

**Chart 2.4 Costs, sales and profits for large listed non-financial firms in the euro area**



Sources: Thomson Financial Datastream and ECB calculations. Note: Data cover around 60% of the non-financial corporations included in the broad-based Dow Jones EURO STOXX index.

**Chart 2.5 Earnings per share (EPS) growth in the euro area for financial and non-financial corporations: actual and expected**



Sources: Thomson Financial Datastream and ECB calculations.

15 years or so. To this end, judging from the latest available annual data for 2006, the largest listed euro area firms' operating income generated outside European countries accounted for almost 40% of total income, compared to about 15% in the early 1990s (see Chart 2.3).

Thus, if history provides any guidance, the relatively sharp expected slowdown in US economic growth in 2008 has the potential to dampen the profitability of euro area non-financial firms.

A potential slowdown in euro area earnings growth emanating from the United States may, however, be partly offset by stronger growth dynamics in other parts of the world, such as in emerging markets.

Available aggregated data on the earnings items of euro area non-financial firms confirms a more uncertain earnings outlook. Most notably, the upward trend seen over the past few years in aggregated earnings for non-financial firms included in the Dow Jones EURO STOXX index came to an end in the last two quarters of 2007 (see Chart 2.4).

At the same time, available data on earnings expectations still point towards relatively

robust earnings growth for the non-financial firms included in the Dow Jones EURO STOXX index (see Chart 2.5). Notably, by April analysts expected earnings for the non-financial sector to exceed the financial sector's profitability over the coming twelve months.

#### RISKS FACING LEVERAGED COMPANIES

Euro area firms' leverage has been on a steady upward trend since 2005 (see Chart S51). Improved investment opportunities coupled with favourable financing conditions have helped to fuel this process. The gradual move of firms towards holding more debt has, however, made them more vulnerable to unexpected and adverse shocks. In particular, a combination of lower than expected economic growth and even more intense financial market turbulence could induce substantial credit downgrades for the most indebted firms.

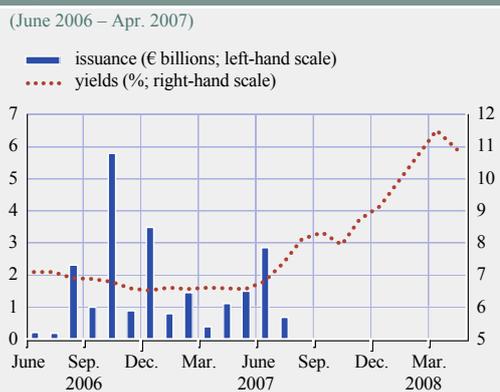
Concerning risks emanating from the real economy, after the finalisation of the last FSR the possibility of a protracted slowdown in some major markets significantly increased. The "financial accelerator" effect suggests that an adverse shock to the real economy tends to worsen firms' balance sheet positions, leading to higher finance premiums, which protracts the slowdown in the economy even after the initial

shock has dissipated.<sup>3</sup> This process tends to be more severe the more indebted firms are.

The prolonged financial turmoil has added further upward pressure on the financing costs of firms. A rough measure of the real cost of finance facing non-financial firms (calculated by combining the cost of bank financing, market-based debt financing and equity financing) stood at 4.7% in February, which was 35 basis points above the level prevailing before the outbreak of the market turmoil last summer (see Chart S49).

The overall figure masks some important shifts taking place among the available forms of financing. In particular, the recent turmoil seems to have brought about some substitution effects where firms have to a large extent relied on bank financing over market debt financing (see also Box 6 for a euro area/United States comparison). For instance, issuance in the “high yield” segment has virtually dried up since the summer of 2007 (see Chart 2.6). At

**Chart 2.6 Euro area issuance activities and corporate bond yields for the high yield segment**



Source: Dealogic.

the same time, lower risk appetite coupled with a reassessment of default risk on the part of investors has driven up the yields offered on corporate bonds in the same segment.

<sup>3</sup> See “The Financial Accelerator and the Credit Channel”, speech of 15 June 2007 by Federal Reserve Board Chairman B. S. Bernanke.

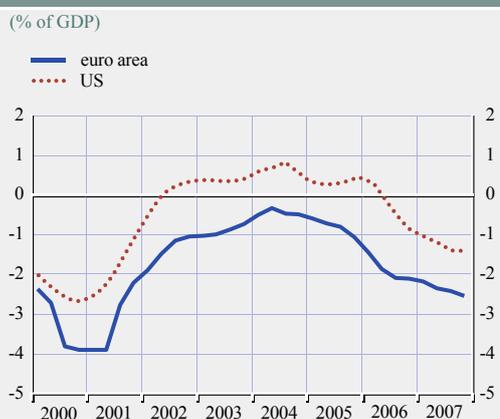
**Box 6**

**HOW VULNERABLE ARE EURO AREA AND US FIRMS TO FURTHER TENSIONS IN CREDIT MARKETS?**

In assessing the potential impact that the strains in financial markets may have on euro area and US non-financial companies, firms’ leverage and the cost of finance play a key role. To this end this box first examines some of the differences between euro area and US firms with regard to their reliance on bank and market-based sources of financing. It then goes on to assess how these differences together with higher financing costs may impact on the balance sheets of the enterprises.

To evaluate firms’ overall need for finance, Chart A depicts the financing gap as a percentage of GDP (i.e. the net lending or net borrowing ratio) for euro area and US non-financial firms. As can be seen, since 2000 the financing gaps – a measure of how reliant

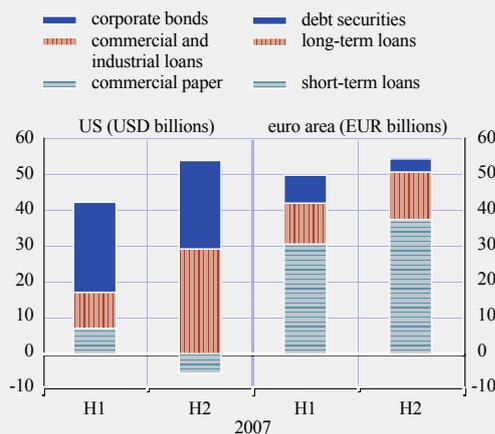
**Chart A Financing gap of non-financial corporations in the euro area and the United States**



Sources: ECB and Federal Reserve Board.  
Note: The financing gap is defined as the net lending (+) or net borrowing (-) of the sector in relation to whole economy GDP.

**Chart B Selected components of net debt financing of non-financial corporations in the euro area and the United States**

(monthly rate; end-of-period data, seasonally adjusted)



Sources: ECB and Federal Reserve System.

firms are on external funding sources – of the two economies have broadly followed the same pattern. It is, however, notable that the financing gap for euro area firms consistently hovered somewhat below the financing gap of US firms. Other measures, such as the debt-to-GDP ratio, confirm that euro area firms are, on average, more leveraged than their US counterparts.

One structural feature to be noted when comparing the two economic areas is that the functions of the financial systems differ, in particular with regard to sources of finance for companies. In principle, there are two debt financing sources available for firms; they can either borrow funds directly from lenders in financial markets (market-based finance) or they can approach financial intermediaries for

funds. In the euro area, most of the financing is channelled through the banking system, whereas in the United States market-based finance is more prominent. For instance, in terms of outstanding amounts, bank loans made up around 85% of the total debt of euro area firms in 2006, whereas only 25% of the debts of US firms consisted of bank loans.

Keeping in mind that the euro area and US series are not entirely comparable, owing to different classifications, Chart B shows flow data on debt financing sources for the two economies in 2007. The chart suggests that both US and euro area firms' reliance on loans from financial institutions (in the United States defined as commercial and industrial loans) increased during the credit market turmoil. In the euro area only a small fraction of debt financing was channelled through debt securities issuance in the latter part of 2007.

The above-mentioned shifts in euro area and US firms' sources of financing are closely intertwined with financing costs. To this end, both bank and market-based financing costs are examined in some detail below.

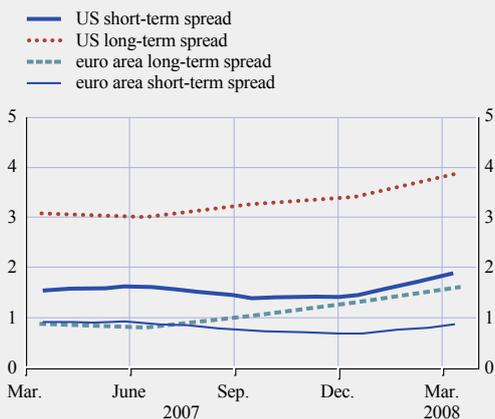
The simplest approach to take when examining cross-country differences in bank financing costs is to explore how the spreads between bank rates and risk-free rates (usually approximated by the interest rates offered on Treasury bills and government bonds) have developed. Chart C depicts the spreads on both short and long-term bank loans in the euro area and the United States since the first quarter of 2007, i.e. just before the turbulence erupted.<sup>1</sup> Two features can be inferred from the chart. First, both euro area and US longer-maturity spreads have increased sharply, by nearly 90 basis points, during the turmoil.<sup>2</sup> Second, the shorter-maturity bank spreads have remained broadly unchanged in the euro area, whereas similar bank spreads in the United States increased by some 40 basis points.

1 Given that interbank interest rates have diverged from the two central banks' policy rates, the chart makes use of three-month interbank rates in the calculation of the shorter-maturity spreads.

2 It should, however, be noted that long-term bank spreads may have been amplified by flight-to-safety shifts from risky assets to benchmark government bonds. See also Box 1 in ECB (2008), *Monthly Bulletin*, April.

**Chart C Spreads on MFI loans to non-financial corporations in the euro area and the United States**

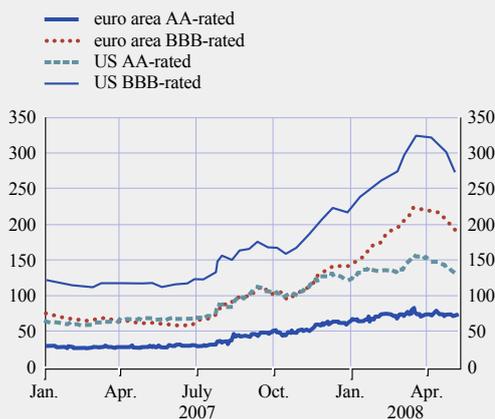
(percentage points)



Sources: Federal Reserve System and ECB.  
 Note: Short-term spreads are calculated using the three-month EURIBOR in the euro area and the three-month LIBOR in the United States. For long-term spreads the five-year and two-year bonds are used for the euro area and the United States respectively.

**Chart D Option-adjusted corporate bond spreads in the euro area and the United States**

(basis points, spreads over long-term government bonds)



Sources: Bloomberg and Merrill Lynch.

It should however be kept in mind that the spread widening in US bank rates has been offset by the loosening of the US monetary policy stance.

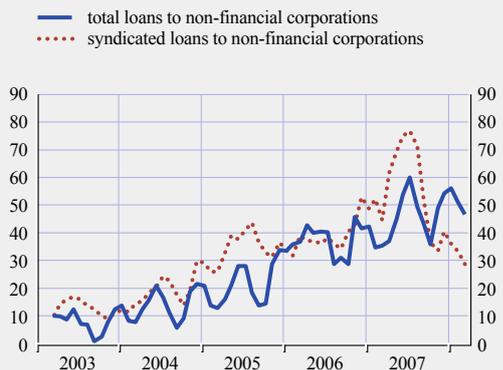
In the same vein, Chart D shows euro area and US option-adjusted corporate bond spreads. Both AA and BBB spreads are displayed in order to gauge how market-based financing costs have developed for firms according to their creditworthiness. As seen in the chart, US spreads increased by larger magnitudes compared with comparable spreads in the euro area. For instance, between January 2007 and early May 2008 US BBB spreads surged by 150 basis points compared with a 120 basis points increase in euro area BBB spreads.

To sum up, financing flows from financial institutions to US and euro area firms increased in the second part of 2007. Thus, non-financial corporations in the two economies seem to have favoured bank loans over other forms of debt financing during the turmoil. This development is consistent with the fact that cost of finance measures show that market-based debt financing has become relatively more expensive than bank debt financing in both economies. At the same time, when comparing financing costs (defined as loan and corporate bond yield developments relative to proxies for the risk-free rate), they have tightened more for US firms than for non-financial corporations in the euro area.

Going forward, continued tensions in financial markets would probably lead to an acceleration in corporate defaults in both economies given the expected deteriorating macroeconomic outlook and a probable slowdown in corporate profitability. Furthermore, if the trend towards higher market-based financing costs relative to bank financing costs continues, this will probably have a less marked impact on euro area corporations, given that they rely more on banks for their funding than US firms do.

**Chart 2.7 MFI loans to non-financial corporations and syndicated lending**

(Mar. 2003 – Mar. 2008; three-month moving average; € billions)



Sources: ECB and Dealogic.

**Chart 2.8 EONIA swap rate, three-month EURIBOR and short-term lending rates to non-financial corporations**

(Jan. 2003 – Mar. 2008; %)



Source: ECB.

The above-mentioned challenges that firms have faced in accessing market-based debt financing have induced them to tap banks for credit (see Chart 2.7). In March 2008, the total annual growth in bank lending to non-financial firms stood at 15% (see Chart S47). There are, however, some indications that the growth in corporate lending may decelerate in the near future. In particular, two factors supporting a potential turnaround in the corporate credit cycle can be identified. First, a fundamentals-based loan growth model suggests that credit growth may have reached its peak, as in recent months it has become less buoyant than its fundamental determinants (see Box 7).

Second, there has been a sharp slowdown in syndicated loan facilities recently (see Chart 2.7).<sup>4</sup> These facilities should be interpreted as committed credit lines, which are not necessarily drawn by the borrowers at the time of the agreement. Once committed, the terms of the loan cannot be generally modified before it reaches the agreed maturity. In this sense, companies with pre-committed loan facilities might still be able to obtain funds on the same cheap terms that were prevailing before the turmoil. This share of loan volumes would then not necessarily imply a corresponding willingness of banks to lend. Since 2003 signed syndicated loan agreements have tended to

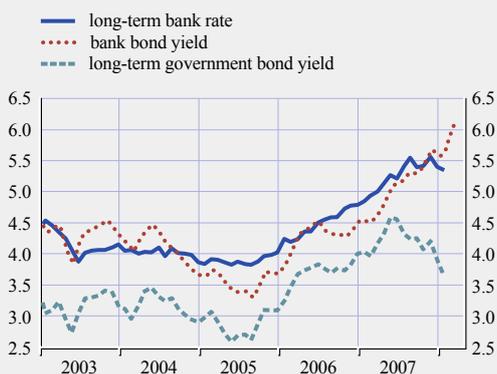
move broadly in tandem with actual loan growth developments. Thus, it cannot be excluded that the still strong observed loan growth can be traced partly to the fact that firms are drawing on existing loan facilities that were written before the turmoil started. Going forward, for the relationship between the two series to be restored in the near future, a drop in MFI lending to non-financial corporations cannot be ruled out (with some lag due to the average maturity of existing credit agreements).

Under normal circumstances, short and long-term bank lending rates tend to mimic movements in risk-free rates (approximated in the euro area by EONIA swap rates and the yields offered on long-term government bonds). However, since the summer of 2007, these margins have increased as both short and long-term bank lending rates have decoupled from these nearly risk-free rates (see Chart 2.8 and Chart 2.9 and Section 4.2). As a consequence, non-financial firms have experienced higher funding costs from banks despite the fact that ECB policy rates have remained unchanged.

4 A BIS study concludes that timely syndicated credit data can provide some useful advance information about the consolidated data. See Bank for International Settlements (2002), "Do syndicated credits anticipate BIS consolidated banking data?", *BIS Quarterly Review*, March.

**Chart 2.9 Long-term bond yields, bank bond yields and long-term bank rate for loans to non-financial corporations**

(Jan. 2003 – Apr. 2008; %)



Source: ECB.

All else being equal, large spreads between bank lending rates offered to firms and the risk-free rate suggest sluggish pass-through effects and problems for firms in accessing credit. It is, however, important to note that banks' mark-up (i.e. the spreads between MFI lending rates and the cost of funding for the banks) have changed little since the turmoil erupted last summer (see Chart 2.8 and Chart 2.9). For instance the difference between short-term bank rates and the three-month EURIBOR stood in February 2008 at 90 basis

points, which was broadly the same as the level of the spread in June 2007, before the outbreak of the financial turmoil (see also Box 6).

### OVERALL ASSESSMENT OF RISKS IN THE CORPORATE SECTOR

Although firms' balance sheets in general remain sound, the recent turmoil coupled with downward revisions in economic growth have increased non-financial firms' vulnerabilities to future shocks compared with the assessment conducted for the December 2007 FSR. There are three related factors supporting this. First, although most indicators suggest fairly robust earnings growth in the first part of 2008, the short to medium-term earnings outlook has become more uncertain. Second, recent increases in financial leverage and financing costs may have negative repercussions on firms' balance sheets if further shocks to the financial system were to materialise. Third, new arrangements of lending facilities have sharply dropped since last summer, pointing to risks of a turn in the corporate credit cycle. Finally, it should be noted that so far there is only limited evidence that the financial market turbulence since the summer of 2007 has strongly influenced corporate loan growth developments.

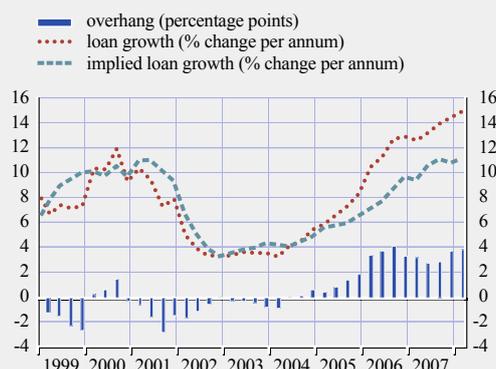
#### Box 7

##### IS THE CORPORATE BANK LENDING CYCLE TURNING?

Non-financial corporate lending in the euro area has expanded strongly since 2002, and reached a nominal annual growth rate of 15% in March 2008. In spite of the tensions in global credit markets, bank lending to euro area non-financial corporations has thus remained strong, suggesting that firms, so far, have weathered the turbulence well. The resilience in loan growth observed up to early 2008 is unusual as financial institutions' lending criteria tend to tighten in periods of financial stress, resulting in lower credit growth and a slowdown in economic activity. Looking ahead, ECB bank lending survey data show that the trend towards euro area banks tightening their credit standards on loans to enterprises that began in late 2007 continued in early 2008. This may, in due course, indicate a turn in the corporate credit cycle, as it becomes more costly and difficult for non-financial corporations to gain access to bank financing. This box evaluates the state of the current corporate credit cycle by comparing observed loan growth with implied credit growth suggested by a simple model.

A standard gauge of the vulnerability of current credit growth to future corrections is to compare actual loan growth to the loan growth implied by fundamental factors. Based on this approach, Chart A shows the annual growth rate of loans extended to non-financial firms by euro area banks over the period from 1999 to early 2008 along with the annualised model-based loan growth using the following explanatory variables: GDP, non-residential investment, gross operating surplus of the corporate sector (a measure of firms' internal financing ability), the cost of lending, the cost of non-bank external financing, and the policy rate. The first three variables can be said to reflect firms' financing needs and the last three are included to capture the actual and relative cost of bank financing compared with external non-bank sources.

**Chart A Actual and model-implied annual growth rate of MFI loans to non-financial corporations in the euro area**



Sources: ECB and ECB calculations.

Note: The co-integrating equation is  $\text{realloans} = 1.0 * \text{realgdp} - 0.04 * (\text{real loan rate} - \text{real cost of alternative financing}) + 14.5$ , where  $\text{realloans}$  is the log of real loans to non-financial corporations (seasonally adjusted and deflated with the GDP deflator) and  $\text{realgdp}$  is the log of real GDP. The model includes two additional co-integrating vectors expressing an investment equation and a long-run loan rate mark-up, respectively.

Three notable features can be seen from the results of the analysis. First, over the past five years a strong upward trend in corporate loan growth has been observed, probably reflecting both the economic recovery and the decline in both policy and market rates during this period. Second, since 2005 loan growth has exceeded the average growth rate over the sample period (of around 8%), surging from around 6% to 15% in the first quarter of 2008. Third, since 2005 the model-implied loan growth has also trended upwards, spurred by a more favourable economic outlook and low financing costs. However, the upturn in actual loan growth has been persistently more pronounced than the increase in the model-implied credit growth. In the first quarter of 2008 only part of the actual loan growth can be explained by the model.

The large and persistent difference between actual and model-implied loan growth (the so-called "overhang") suggests that factors other than fundamental business cycle developments, such as M&A financing, country-specific developments in the construction and real estate sectors and financial innovation, have played an important role in explaining euro area MFI lending to the non-financial corporate sector since 2005. However, the abrupt repricing of risk that has occurred in global credit markets since mid-2007 may have reduced to some extent the importance of these special factors in explaining corporate loan growth. In particular, leveraged finance activity in the euro area slowed down considerably in the second half of 2007. Accordingly, the overhang has stabilised in the course of 2007 and early 2008.

All in all, according to the model employed in this analysis, credit growth may have reached its peak, and in recent months it has become less buoyant relative to its fundamental determinants.

### 2.3 COMMERCIAL PROPERTY MARKETS

Commercial property market developments are important from a financial stability perspective for several reasons, the most important being that lending for development and ownership of commercial property is often an important component of the assets of financial institutions.<sup>5</sup>

#### DEVELOPMENTS IN COMMERCIAL PROPERTY MARKETS

Commercial property inflation rates declined in most euro area countries during 2007, although prices on average still rose by about 4.6% (see Chart S59). Countries which have witnessed very high commercial property price inflation during recent years saw these rates decline sharply, and in some countries/cities prices in certain segments (in particular office space) even declined. For countries where higher frequency data are available, the indications are that price increases slowed down markedly or, in some cases, prices even fell during the latter part of 2007 and early 2008.

Income returns remained low which, together with more modest price increases, led to a decline in total returns (capital value growth plus income returns) in many countries, although

they still remained on average at a relatively high level of around 10% (see Chart 2.10).

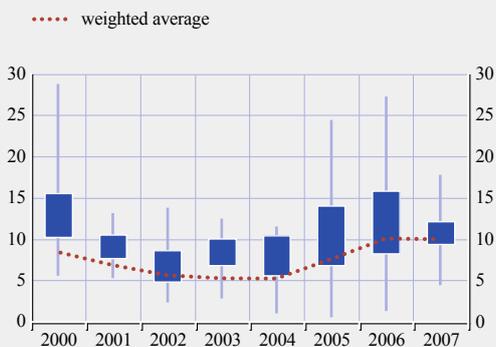
Information that became available after the December 2007 FSR was finalised suggests that price increases were halted by reduced demand for commercial property investments in the euro area in the second half of 2007. Transaction volumes stood at about € 65 billion (€ 131 billion for 2007 as a whole), which was 1.6% less than during the second half of 2006 (see Chart 2.11).<sup>6</sup>

There were, however, wide variations in investment volumes across euro area countries in the second half of 2007 (see Chart 2.11). These large differences between countries could be explained by the different stages that the commercial property markets in different countries are in. Indeed, countries where

- 5 For a discussion of the importance of commercial property markets from a financial stability perspective, see ECB (2007), "Commercial property investment and financial stability", *Financial Stability Review*, December.
- 6 For a description of conditions in the European commercial real estate market, see, for example, Jones Lang LaSalle (2008), "European Capital Markets Bulletin 2007 and views of 2008", February.

**Chart 2.10 Euro area country distributions of total returns on commercial property**

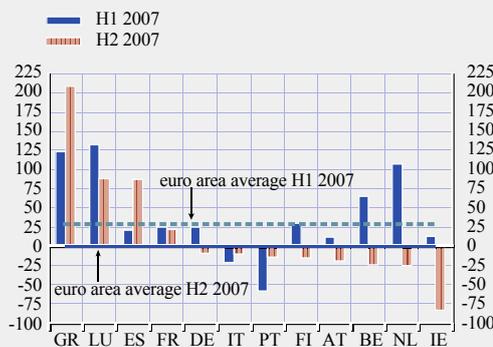
(2000 – 2007; %; minimum, maximum and interquartile distribution of country-level data)



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%.

**Chart 2.11 Growth in direct commercial property investment volumes in the euro area**

(% change per annum)



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

investment volumes have grown rapidly during recent years and where property prices have started to stagnate or fall in general also witnessed lower investment demand.

The share of cross-border investments involving non-domestic buyers or sellers of property in the euro area, which has been increasing in recent years, fell somewhat in the second half of 2007, although it remained relatively high at 61% of total investments. This reduction was probably due to investors seeking comfort in domestic markets amid the uncertainty prevailing in many commercial property markets.

Unlisted funds and global investors, such as sovereign wealth funds, continued to be the most active investors in euro area commercial property markets in the second half of 2007. The major net sellers of commercial property continued to be non-commercial property companies, with large use of sale and lease-back arrangements (for example Banco Santander in Spain and Deutsche Telekom in Germany).

Information available on investment activity in the first quarter of 2008 suggests that the already lowered investment volumes during the second half of 2007 continued to decline in most euro area countries.<sup>7</sup>

#### **RISKS FACING COMMERCIAL PROPERTY INVESTORS**

Commercial property investors typically face two types of risks: first, they bear income risks if vacancy rates increase, rents decrease or prices fall; second, they are exposed to funding risks due to the availability and cost of debt if, for example, interest rates increase, banks tighten lending standards or demand for corporate bonds decreases.

After the finalisation of the December 2007 FSR signs of commercial property companies facing increased income risks, at least in some countries, started to appear. Property price increases have slowed down markedly or, in some countries, prices have even fallen. This could pose challenges for commercial property

investors, such as property funds, that have to sell property to finance redemptions.

Demand for rented commercial property, however, held up relatively well after the finalisation of the December 2007 FSR, thus supporting a more stable income outlook for property owners. Furthermore, vacancy rates even declined somewhat to around 8% in the first quarter of 2008. Rents continued to grow, albeit at a reduced pace compared with earlier quarters, with increases on average of about 5.5% year on year for both office and retail space for a set of 20 large euro area cities (the growth rates for the individual cities ranged from -2% to 15%).<sup>8</sup> Although indications are that demand for rented commercial property has remained relatively strong, a slowdown going forward cannot be ruled out amid the moderation of economic growth in the euro area and the deteriorating economic outlook after the finalisation of the December 2007 FSR (see Section 2.1). Furthermore, the recent slowdown in labour market developments in the euro area could reduce the demand for rented property, especially office space (see Section 2.4).

Funding costs and risks increased after the finalisation of the December 2007 FSR. Banks have tightened lending standards for commercial property loans, including the application of lower loan-to-value ratios. Banks' willingness to lend for commercial property ownership and development has also been reduced due to the drying-up of the commercial mortgage-backed securities (CMBS) market, which has reduced the ability of banks to spread credit risk (see Box 11 in Section 3.2). A less than fully functioning CMBS market has the potential to lower bank loan supply and thereby increase funding costs and affect commercial property prices negatively. Higher yields on corporate bonds after the finalisation of the December 2007 FSR also increased funding

<sup>7</sup> See CB Richard Ellis (2008), "European Investment Quarterly Brief Q1 2008".

<sup>8</sup> See Jones Lang LaSalle (2008), "Key Market Indicators Q1 2008", April.

**Chart 2.12 Euro area commercial property company share prices and the Dow Jones EURO STOXX 50 index**

(Jan. 2003 – May 2008; index: Jan. 2003 = 100)

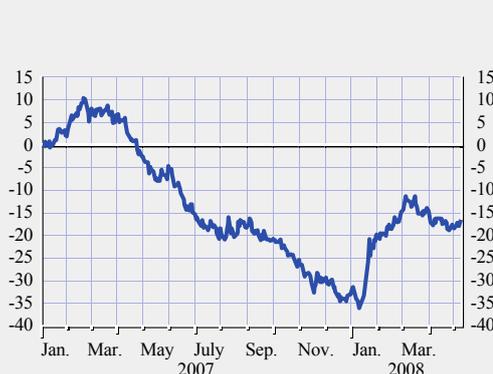


Source: Bloomberg.

Note: The euro area FTSE EPRA/NAREIT property index includes traded real estate shares of closed-end companies engaged in the ownership of, trading in and development of income-producing real estate.

**Chart 2.13 Cumulative changes in euro area commercial property company share prices relative to the Dow Jones EURO STOXX 50 index**

(Jan. 2007 – May 2008; percentage points; base: Jan. 2007 = 0)



Source: Bloomberg.

Note: The euro area FTSE EPRA/NAREIT property index includes traded real estate shares of closed-end companies engaged in the ownership of, trading in and development of income-producing real estate.

costs for those commercial property companies issuing bonds to finance investments. Higher funding costs are likely to shift demand from leveraged investors, who have been behind much of the investment in recent years, to equity-based investors such as insurance companies, pension funds and sovereign wealth funds.

As reported in the December 2007 FSR, balance sheet vulnerabilities could also arise among commercial property investors who have invested in more risky assets, such as property developments. Some euro area commercial property investors are also active globally, and they could face risks from exposures to commercial real estate in, for example, the United States and the United Kingdom, where commercial property market conditions have deteriorated more markedly lately.

#### OUTLOOK FOR COMMERCIAL PROPERTY COMPANIES ON THE BASIS OF MARKET INDICATORS

The uncertainty surrounding the outlook for euro area commercial property markets after the finalisation of the December 2007 FSR manifested itself in recent share price performances of companies engaged in ownership of, trading in and development of income-producing real estate. These

prices continued falling until the end of 2007 (see Chart 2.12). Expected lower income returns and investment demand for commercial property investments probably contributed to the decline.

Since the beginning of 2008, however, share prices of commercial property companies have rebounded somewhat, especially compared to the overall stock market (see Chart 2.13). This suggests that market participants view the outlook for the sector more positively than they did at the beginning of the year, although many stocks are still trading below the companies' net asset value, implying that capital value declines are expected.

#### OVERALL ASSESSMENT OF RISKS IN COMMERCIAL PROPERTY MARKETS

The overall outlook for euro area commercial property markets remains uncertain and some risks and vulnerabilities in the markets have increased and started to materialise. Higher funding costs and stabilising or, in some cases, falling property prices have reduced investor demand and could weaken demand further. Furthermore, the deteriorating economic and labour market outlook for the euro area has the potential to negatively affect demand for rented commercial property, thus increasing vacancy rates and lowering rents.

## 2.4 BALANCE SHEET CONDITION OF THE HOUSEHOLD SECTOR

Although household sector indebtedness continued to reach new heights in the six months after the finalisation of the December 2007 FSR, the overall assessment of household sector balance sheets as a potential source of risk from a financial stability perspective has not changed substantially – the central scenario still being one of continued sustainability.

While elevated short-term interest rates may have challenged the ability of some households to service their debts, there are a number of factors, such as the outlook for the labour market and expected developments in household income that, although showing some deterioration, still remain supportive of household sector balance sheets. At the same time, the pace of new household sector borrowing has continued slowing during the past six months, albeit remaining at a high level. There have also been signs of gradual moderation in a number of euro area housing markets, in spite of the risks of a potentially more disruptive adjustment. However, vulnerabilities may be growing for households in those parts of the euro area where housing valuations appear tight, where the debt build-up has been most pronounced and where the majority of debt is financed at variable interest rates. More generally, a close monitoring of the labour market and the financial situation of households looking forward in a context of economic slowdown is warranted.

### HOUSEHOLD SECTOR LEVERAGE

The annual rate of growth of total loans to the household sector declined slightly to 6.8% in the fourth quarter of 2007, from 7.3% in the previous quarter. In particular, the annual growth rate of loans granted by MFIs to households declined further to 6.2% in the fourth quarter of 2007 and 5.9% in the first quarter of 2008 (see Chart S93). This picture masks heterogeneous developments across components. While the contribution from housing loans has declined, that from consumer credit has increased somewhat in recent months

Chart 2.14 Loans for house purchase and house prices in the euro area

(Jan. 2000 – Mar. 2008; % change per annum)



Source: ECB.

(see Chart S61). The slightly slower but still strong rate of growth of household borrowing can be attributed to an environment of relatively high, although deteriorating, consumer confidence and favourable, although tightening, financing conditions (both in terms of lending rates and in terms of credit standards applied by banks) despite the increases in policy interest rates between December 2005 and June 2007.

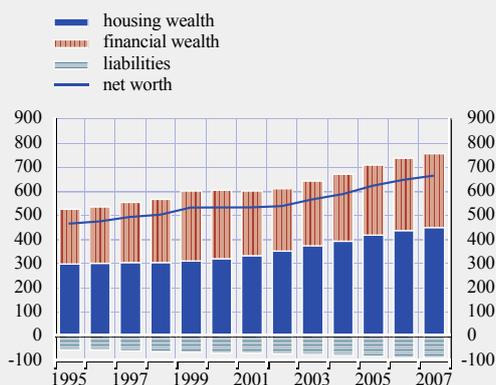
The moderate deceleration of mortgage lending since early 2006 is in line with the loss of momentum in the euro area housing market, with indications that the rate of house price inflation peaked in mid-2005 (see Chart 2.14).

Reflecting the ongoing strength of household sector borrowing in the euro area, the level of indebtedness increased further, although marginally, and is estimated to have reached 60.1% of GDP in the fourth quarter of 2007 (see Chart S63). It is worth bearing in mind that, compared with other industrialised countries, the euro area household sector debt-to-GDP ratio is still rather modest.

While measures of leverage relative to income can provide an indication of the ability of households to service their debt, evaluating this ability compared to assets can provide an indication of the ability to repay debt at an

**Chart 2.15 Household sector net worth in the euro area**

(1995 – 2007, % of gross disposable income)



Sources: ECB and ECB calculations.

Note: Data for housing wealth after 2003 are based on estimates.

aggregate level. The value of household assets, which is much larger than their debt, is estimated to have grown further in 2007. However, the pace of increase has shown, especially for financial wealth, some deceleration in 2007, as in the previous year, compared to the gains reached in 2005. As a result, households saw a further, albeit more modest, rise in their net wealth last year (see Chart 2.15).

One factor that can affect households' ability to repay debt is related to the volatility of household assets relative to that of outstanding liabilities, which tends to be higher for the assets. The extent of this vulnerability depends on the structure and risk attributes of household assets. In particular, the fact that the share of housing wealth in total wealth was around 60% for the euro area in 2007 implies a high exposure to a possible correction in house prices.

Turning to financial assets, more than 90% of euro area households' financial wealth is estimated to be held in relatively safe assets, such as deposits and insurance products. By contrast, financial wealth held in equity and mutual fund shares has remained relatively subdued. Overall, euro area households' exposure to financial market volatility has remained limited.

Regarding the potential ability of households to repay debt if needed, the ratio of total assets to liabilities has remained broadly unchanged in recent years (see Chart S64). The bulk of the rise in household debt has been associated with rising housing wealth.

At the same time, the debt exposures of lower income and lower net worth households may have increased over recent years, as a consequence of innovations in the mortgage market, improved access to funding and a lowering of credit standards in the face of strong competition among lenders.

#### RISKS FACING THE HOUSEHOLD SECTOR

Households are subject to two types of risks affecting their ability to service their debt: interest rate risk, which has continued to increase somewhat in recent months; and income risk, which has remained broadly unchanged recently. Moreover, households are most exposed to the risk of rising debt service burdens when loans are predominantly contracted at variable rates.

##### Interest rate risks of households

After the finalisation of the December 2007 FSR, the ECB maintained key interest rates unchanged, although the cumulative rise in ECB interest rates since December 2005 is 200 basis points. This, together with still robust household borrowing, has led to a further rise in the overall debt servicing burden of households. In particular, interest payments have continued rising slightly in recent quarters, reaching a level of 3.3% of disposable income in the fourth quarter of 2007 (see Chart S65). However, they remain below the peak recorded in mid-2001.

It is worth recalling that debt servicing burdens are unevenly distributed among different household income categories and that ownership of financial assets is highly concentrated. Thus, the risks affecting the most financially vulnerable segments of the population cannot be properly addressed by looking at aggregate data. Moreover, the impact of rising interest rates on household debt servicing costs depends on the

nature of mortgage contracts. Households with outstanding fixed-rate mortgage loans will be shielded from interest rate risks for the duration of the fixation period. It has been estimated in the past that the share of outstanding mortgage debt subject to a variable rate or with an interest fixation of less than one year is relatively low in the euro area as a whole at around 25%, although it varies significantly across countries. Indeed, regarding new loans in 2007, those at variable rates were above 80% in Portugal, Finland and Spain, but below 20% in Belgium, Germany, France and the Netherlands.

Overall, the interest rate risk faced by households increased somewhat after the finalisation of the December 2007 FSR, as the debt servicing burden could still increase for households with variable-rate mortgages. Eventually, this will also feed through to the debt service burden for those households with fixed-rate mortgages when the current contracts come to an end.

Looking forward, interest rates may be affected in the short term by ongoing tensions in money markets related to the financial turmoil, while in the medium term interest rates are expected to decline somewhat.

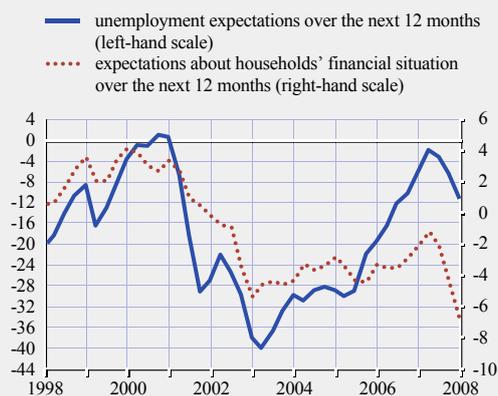
#### Risks to household income

Looking at the debt service burden in isolation may overstate the risks from increases in interest rates, and it is essential to evaluate other sources of risks to households. In particular, developments in income, which are closely linked to the risk of becoming unemployed, are one of the most important predictors of a household's ability to meet its debt servicing obligations.

The macroeconomic environment deteriorated somewhat in the second half of 2007 compared with the first half in terms of growth and employment creation, pointing to a certain increase in income-related risks for households. In particular, the euro area unemployment rate declined only marginally after the finalisation of the December 2007 FSR, and in early 2008 was 7.1% – only 0.6 percentage point below that recorded a year before.

**Chart 2.16 Euro area households' financial situation and unemployment expectations**

(Q1 1998 – Q1 2008; % balances; three-month moving averages)



Source: European Commission Consumer Survey.  
Note: An increase (decrease) in the indicators corresponds to more optimistic (pessimistic) expectations overall.

Survey evidence collected by the European Commission seems to confirm this slowdown, pointing to a change in the pattern of expectations of euro area households regarding their financial situation and, to a lesser extent, their perception of future unemployment prospects (see Chart 2.16). The former can be partly explained by the moderate increase in real income recorded in recent quarters, while the latter is in line with the slowdown in labour market developments in the second half of last year.

Moreover, it is worth stressing the recent decoupling of expectations regarding the financial situation of households from labour market prospects, and the more intense decline recently in the former. The break in the close relationship observed in the past between these two variables may point to the fact that labour market developments are not fully capturing the risks regarding income developments. As mentioned in previous issues of the FSR, the increased awareness of households about risks related to changes in interest rates and housing markets may have contributed to a more pessimistic assessment of financial prospects in the most recent period.

Looking forward, employment growth is expected to remain moderate, with an ongoing

decline, albeit small, in unemployment. At the same time, real income should recover following both a moderate increase in wages and a decline in inflation.

#### Risks to residential property prices

Residential property prices in the euro area as a whole continued to rise at a moderate rate, with an increase of 4.5% in 2007, down from 6.5% in 2006. The available country data confirm that the gradual moderation in house price inflation in the euro area is broadly based, notwithstanding a certain degree of heterogeneity across countries. In particular, house prices in Belgium, Spain, France and Italy continued on a path of gradual deceleration. In Ireland, the observed deceleration in the second half of 2007 was quite sharp, while in the Netherlands and Austria house price increases in the first half of 2007 were roughly unchanged compared with the increases recorded in 2006 (see Table S4). Some recent indicators have pointed to a gradual cooling-off of demand for residential properties since late 2005. At the same time, on the residential property supply side, growth in real residential investment moderated substantially in 2007.

Despite the moderation in house price inflation, crude valuation measures for property prices based on house price-to-rent ratios have continued to provide indications of overvaluation in the residential property market, greater than was the case when the December 2007 FSR was finalised (see Chart S68). Among the largest euro area countries this applies in particular to France and Spain. Nevertheless, the central scenario is for continued steady moderation in house price inflation against the backdrop of indications of overvaluation and rising mortgage borrowing costs. Indeed, recent developments have provided tentative signs that a soft landing could be underway. However, in those countries where overvaluation appears to be most acute the housing market continues to represent a source of risk for household sector balance sheets, although income growth will typically be the more decisive factor in assessing risks to household finances in euro area economies.

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

Overall, risks to the euro area financial sector originating from the household sector are contained and remained broadly unchanged after the finalisation of the December 2007 FSR. On one hand, the debt servicing burden may still increase in the short term, although the ongoing deceleration of loans to households and the outlook of relatively stable interest rates should act as offsetting forces looking forward. On the other hand, unless the macroeconomic environment deteriorates significantly, the outlook for the labour market and for household disposable income still remains relatively positive.





## III THE EURO AREA FINANCIAL SYSTEM

### 3 EURO AREA FINANCIAL MARKETS

After the finalisation of the December 2007 FSR, the risk reappraisal in euro area financial markets became more broad-based, and it intensified in some market segments. In the euro area money market, challenging conditions prevailed towards the end of 2007, exacerbated by end-of-year concerns, and persisted into the new year. Despite signs of respite in February, concerns about counterparty risk heightened, as did end-of-quarter liquidity anxieties. At the same time, the value of securities issued by financial corporations came under significant downward pressure, while the cost of raising finance in capital markets for non-financial corporations rose. Even the liquidity of some euro area government bond markets suffered. Although, by the time of finalisation of this FSR, credit markets were pricing in a substantial deterioration in the profitability of firms, a stronger than currently expected moderation in euro area corporate earnings remains a key risk for credit and equity markets.

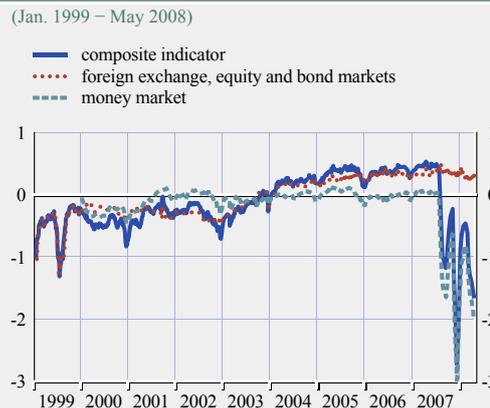
#### 3.1 KEY DEVELOPMENTS IN THE MONEY MARKET

After the finalisation of the December 2007 FSR, tensions in the euro area money market waxed and waned. The approach of the year-end was viewed with considerable concern by market participants in late 2007, but it proved uneventful and tensions eased somewhat in early 2008. However, this proved short-lived and money markets went through a third wave of strain in the approach to the end of the first quarter.

This was evident, for instance, in patterns of market liquidity in the money market (see Chart 3.1). Liquidity in the euro area money market decreased in August 2007, and by early May 2008 it had not fully recovered. The main reason for this was ongoing uncertainty about the exposures of money market counterparties to the sub-prime-related securities. Moreover, the deterioration in money market liquidity was significantly more marked than in other euro area financial markets.

During the last two months of 2007, against a background of acute concerns among market

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



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 are exponentially smoothed.

participants about the likely impact on large European and US banks' balance sheets of losses on sub-prime-related exposures, tensions persisted in global money markets. In the euro area, EURIBOR rates declined from the highs seen in August and September, as did EONIA swap rates for maturities up to one year, but this largely related to changes in expectations regarding ECB interest rates.

However, concerns regarding the forthcoming year-end intensified and large increases in one-month interbank rates were seen at the end of November, as this maturity spanned the end-of-year for the first time. This ushered in a period of increasing tensions, as evidenced by very high spreads between unsecured interbank and EONIA swap rates and a perceived increase in risk aversion among investors and counterparty risk in the interbank market (see Chart S70).

Concerns around year-end, a time when banks typically shore up their balance sheets, were greater in magnitude and commenced earlier than in previous years, given the extent of the uncertainty (see Box 8). The situation worsened after losses and write-downs reported by banks were larger than expected, and demand for funding pushed interbank rates higher, as banks continued to hoard liquidity.

With a view to easing year-end concerns, the ECB announced that it would counter re-emerging tensions by providing ample liquidity in its weekly operations. This had the effect of immediately reducing the EONIA rate. Unsecured deposit, EONIA swap and repo rates with maturities of up to one month also fell as a consequence. Several central banks, including

the ECB, also announced extraordinary operational measures to deal with year-end concerns.

When compared with the pre-turmoil period, recourse by banks to the marginal lending facility of the Eurosystem were larger and more frequent during the turmoil period (see Box 9).

#### Box 8

#### YEAR-END AND QUARTER-END EFFECTS ON MONEY MARKETS

The end of the calendar year typically takes on a particular significance for financial institutions and it is also often associated with changes in the economic behaviour of other market participants. Events in the second half of 2007 created an environment of great uncertainty as the year-end approached and, as a consequence, tensions in money markets were much more acute than is usually the case at this time. This box offers a brief overview of typical year-end and quarter-end considerations.

In the run-up to year-ends or quarter-ends, or the end of any other important financial reporting period, non-financial and financial institutions often take the opportunity to improve their apparent financial health in preparation for public disclosure of their accounts. Commonly known as “window-dressing”, firms do this in order to improve their appearance to shareholders, analysts or, in the case of financial firms, even to ensure that regulatory requirements are fulfilled. For instance, financial firms may reduce their credit exposure and increase their liquidity positions, whilst also trimming the total size of their balance sheets. In the case of hedge funds, there is some evidence that average hedge fund returns are higher in December than during the rest of the year, and this cannot be fully explained by market developments at this time of the year.<sup>1</sup> One possible explanation is that incentive fees levied by hedge fund managers are often accrued through the year, but they are only paid out at the end of the year. Hence, in order to maximise these fees, there can be incentives to inflate returns at the year-end.

Window-dressing activities and concerns about them can lead to increased liquidity risks for some market participants, as many banks reduce their lending in the money market when engaged in these activities. One symptom of this is an increase in overnight rates as the year-end or quarter-end approaches. Those without access to the marginal lending facility, or those who prefer not to use it because of the possible “stigma” associated with it (see Box 9), are often willing to pay a significant forward or term premium for ensuring the adequacy of their liquidity positions at the turn of the year or quarter. This effect is not limited to only the last few days of the period in question, as banks reduce their money market participation gradually. Also, as there are typically just a few trading days between Christmas and New Year, opportunities for adjusting liquidity positions are limited in the days immediately preceding the year-end, not least because in most banks many senior staff are on holiday at that time.

In addition, cash demand and its flows among non-financial firms, households and banks are quite volatile during the Christmas shopping season. This introduces another source of uncertainty

<sup>1</sup> See V. Agarwal, N. Daniel and N. Naik (2007), “Why is Santa so kind to hedge funds? The December return puzzle!”, March, available at SSRN.

about an individual bank's liquidity position, since it is more difficult for banks to forecast their cash holdings and reserves at the central bank (the latter can be used to obtain cash from the central bank, while cash can be deposited with the central bank to increase reserve holdings that are used for interbank transfers).

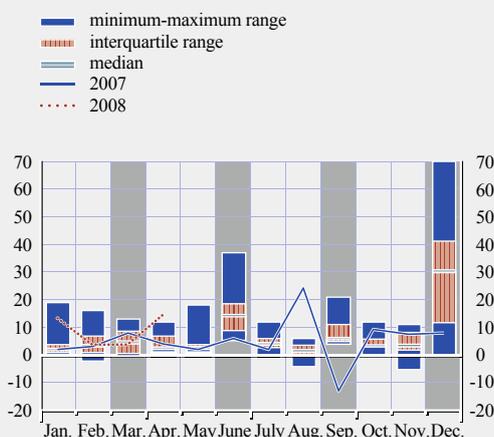
Although the most recent year-end was atypical, it serves as an effective illustration of end-of-period concerns. Higher term premiums were very evident in EURIBOR rates. For example, when the two-month EURIBOR crossed the year-end for the first time, it jumped by 29 basis points, while the same event caused the two-week EURIBOR to increase by 80 basis points. Calculating implied overnight interest rates from these levels gives interest rates of approximately 12% and 8% respectively, far in excess of the ECB's marginal lending facility. Similar effects can be seen with US rates.

As another example, Chart A shows the dispersion of EONIA changes over the last two days of the month. It clearly highlights end-of-reporting-period effects, particularly at the end of June and December. After August 2007, however, due to stabilising open market operations by the ECB these effects became less evident. The last time the year-end took on great significance in financial markets was at the end of 1999. Known as the Y2K problem, fears of liquidity shortages became acute on account of uncertainty about the capacity of computer systems to deal with the transition to the new millennium. It is notable that the concerns that prevailed towards the end of 2007 about counterparty risk were far more pronounced than were the concerns in 1999 (see Chart B).

All in all, there are important changes in the economic behaviour of various market participants at the end of each year, quarter or any other important reporting period. These seasonal effects are well known and anticipated by banks and other market participants, providing them with an opportunity to adjust their liquidity positions and risk management strategies accordingly. However, in times of stress such effects can far exceed historical patterns and may even require special measures to be taken by central banks in order to contain their negative impact on market functioning.

**Chart A Dispersion of month-end changes in the EONIA rate**

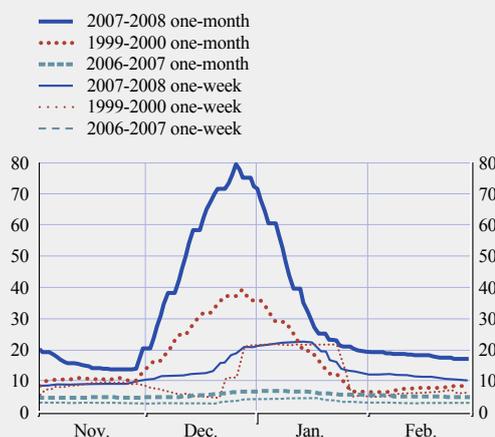
(Jan. 1999 – Apr. 2008; basis points; changes in the EONIA rate over the last two trading days of the month)



Sources: European Banking Federation, ECB and ECB calculations.  
Note: Dispersion ranges refer to the 1999-2006 period.

**Chart B Euro area spreads between unsecured interbank deposit and repo interest rates around the year-end**

(Nov. – Feb. of 1999-2000, 2006-2007 and 2007-2008; basis points; 20-day moving average)



Source: ECB.

### EUROSYSTEM STANDING FACILITIES AND FINANCIAL STABILITY

Standing facilities are designed to provide and absorb overnight liquidity and are aimed at bounding overnight market rates. Two standing facilities are available to eligible Eurosystem counterparties on their own initiative, subject to their fulfilment of certain operational access conditions. Counterparties can use the marginal lending facility to obtain overnight liquidity from the national central banks (NCBs) against eligible assets and can use the deposit facility to make overnight deposits with the NCBs. The interest rate on the marginal lending facility normally provides a ceiling and the interest rate on the deposit facility a floor for the overnight interest rate. Under normal circumstances, there are no restrictions on the access of counterparties to these facilities, apart from the requirement to present sufficient underlying assets when using the marginal lending facility. Counterparties must fulfil certain eligibility criteria defined with a view to giving a broad range of institutions access to the standing facilities, whilst ensuring that certain operational and prudential requirements are taken into account: institutions must be subject to the Eurosystem minimum reserve system; they must be financially sound (subject to supervision by national authorities); and they must satisfy operational criteria defined by the respective NCB.

Even if not designed with a view to ensuring financial system stability, standing facilities may contribute to it in at least two different ways. First, the standing facilities define an interest rate corridor bounding the volatility of overnight interest rates and, by arbitrage, also the volatility of other short-term interest rates. This provides insurance against extreme (and unexpected) spikes in money market rates, and thereby also contributes to reducing the term premium along the entire yield curve. This insurance mechanism is inversely proportional to the width of the interest rate corridor. A caveat for a very narrow corridor is that interbank overnight activity may dry up, and for a very wide corridor, that the stabilising role may be insufficient, in particular on the last day of the reserve maintenance period (RMP). The optimal width from a financial system stability viewpoint will depend on the balance between these considerations.<sup>1</sup> Second, the marginal lending facility provides automatic liquidity insurance for individual institutions. In fact, as long as the institution has collateral, it can always run a daylight overdraft with an NCB (i.e. intraday credit), which will be automatically transformed by the NCB into an overnight credit via a recourse to the marginal lending facility. Given that the Eurosystem accepts a wide range of collateral for marginal lending (e.g. marketable and non-marketable assets which include credit claims and retail mortgage-backed debt instruments) the liquidity insurance mechanism is very effective. However, recourses to the marginal lending facility are relatively costly for Eurosystem counterparties. Thus, from the perspective of a lender of last resort, the marginal lending facility embodies the Bagehot principle (lending any amount to illiquid, but solvent institutions, at a penalty rate and against good collateral). This feature of the marginal lending facility contributes to financial system stability by making banks less vulnerable to failure due to liquidity problems, and thus mitigates the risks of contagion and bank runs.

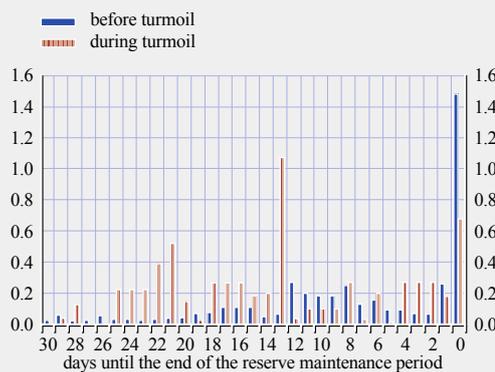
This box uses data on the daily aggregate recourses to marginal lending by all Eurosystem counterparties from 10 March 2004 until 11 December 2007 (45 RMPs) and compares the periods before and after August 2007 (turmoil period, four RMPs). The data show that, under normal market conditions, marginal lending is used mainly towards or on the last day of the RMP (see Chart A).

<sup>1</sup> Since April 1999 the Governing Council of the ECB has kept the interest rate corridor symmetric around the minimum bid rate (+/- 100 basis points). Since the reform of its operational framework the Bank of England has used the same interest rate corridor as the ECB except on the last day of the RMP where it is narrowed (+/- 25 basis points).

On the last day of the RMP marginal lending can be sizable but should be seen as an aggregate recourse that is necessitated by a possible increase in aggregate liquidity needs, distributed across the counterparties. On other days recourses to the marginal lending facility are infrequent and for very small amounts. At around the third week of the RMP there seems to be a temporary increase in the recourse to marginal lending which may be related to the fact that the end of the month falls, in general, around that time. This might suggest “last-minute” borrowing for window-dressing purposes. During the turmoil period, use of marginal lending occurred more frequently and for larger amounts, and it was more evenly spread throughout the RMP.

**Chart A Average recourse to the marginal lending facility of the Eurosystem on different days of a reserve maintenance period**

(10 Mar. 2004 – 11 Dec. 2007; 45 reserve maintenance periods; € billions; daily averages)



Source: ECB.

Overall, larger and more frequent recourses to marginal lending can be expected under stressed market conditions with the caveat that a stigma may arise under such conditions, because banks may be less willing to have recourse frequently and in sizeable amounts. The stigma may arise even if the central bank does not reveal the identity of the counterparties that had recourse to the facilities, as long as the aggregate figure is published, as is the case for the Eurosystem. Still, given that after August 2007 the frequency and the volumes of recourses to marginal lending have not decreased, there is no clear evidence of the emergence of a stigma attached to marginal lending in the Eurosystem.

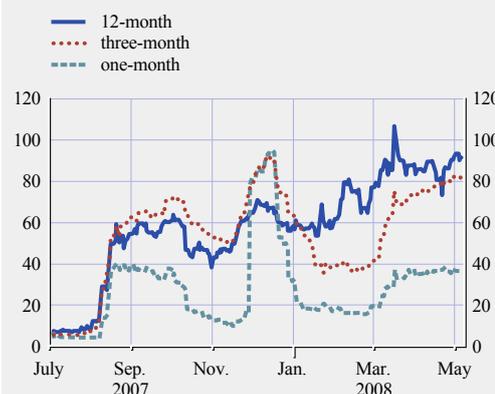
In January 2008, despite fears relating to the US economy and the potential for more bad news in the bank earnings season and what it might hold for medium-sized European banks, the euro area money market seemed to make slow progress towards normalisation. EURIBOR rates and their spreads over EONIA swap rates declined to lower levels in the shorter maturities – the one-month spread fell below 20 basis points for the first time since November – although, ominously, spreads continued to climb for longer terms (see Chart 3.2 and Box 10). The combined effects of central bank actions and the relatively orderly year-end appeared to return some confidence to the market. A period of relative calm ensued, with the overnight interest rate returning to levels very close to the policy rate, while longer-term refinancing rates also declined.

In February and March, however, tensions heightened once again and were exacerbated by the approaching quarter-end coupled with

the coincidental Japanese financial year-end. Japanese banks had reportedly supplied liquidity to foreign banks from the outset of the turmoil, but there were concerns that they could withdraw

**Chart 3.2 Spreads between EURIBOR and EONIA swap rates**

(July 2007 – May 2008; basis points)



Source: Bloomberg.

this funding in preparation for their financial end-of-year, with a resultant increase in liquidity concerns. These seasonal factors were just an added worry and, once again, concerns about banks' results and further potential write-downs were the main concerns.

In response, several central banks, including the Federal Reserve, the ECB and the Swiss National Bank, announced joint operational measures, including the reactivation of a term auction facility (TAF) by the Federal Reserve. In connection with the TAF, the Eurosystem conducted US dollar liquidity-providing

operations with the US dollars being provided by the Federal Reserve by means of a temporary reciprocal currency arrangement or swap line. The impact of these statements was dampened, however, by rumours surrounding large US banks, and events which led to the Federal Reserve offering emergency funding to a large investment bank. On this news, euro area money market spreads reached record levels for six and 12-month maturities, but the very short term remained largely unaffected, unlike comparable markets in the United States and the United Kingdom, prompting further emergency measures by central banks in those countries.

#### Box 10

#### EVIDENCE ON LIQUIDITY AND CREDIT RISK FROM DEPOSIT-OIS SPREADS

One of the most important features of the recent financial turmoil has been wide money market spreads. A commonly used measure of the risk premium in interbank markets is the spread between unsecured deposit and EONIA swap rates (the deposit-OIS spread). In the euro area, deposit rates are indicated by EURIBOR fixings, based on a trimmed average of unsecured deposit quotes provided by a panel of up to 43 banks, while overnight-indexed swaps (OIS) serve as a proxy for overnight rate expectations.<sup>1</sup> These spreads, which before the inception of the financial turmoil hovered below ten basis points for maturities of up to twelve months and below five basis points for shorter maturities, reached record levels in recent months. This box outlines the evolution of these spreads and examines the information they may contain regarding credit and liquidity concerns.<sup>2</sup>

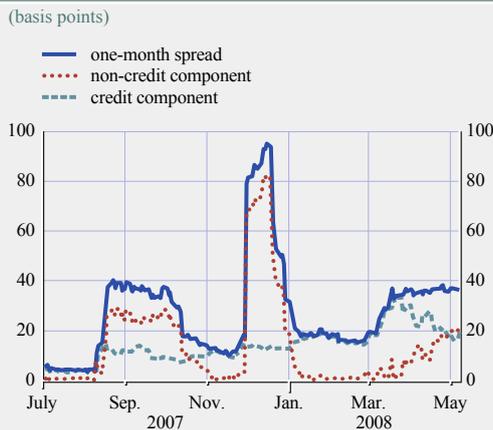
At the outset of the financial turbulence in the summer of 2007, deposit-OIS spreads for all maturities increased significantly (see Chart 3.2). However, as a result of concerted actions by central banks, and a subsequent decline in liquidity concerns, the one-month spread fell noticeably while the 12-month spread remained high. Both the one and three-month spreads showed distinct end-of-year effects, again reflecting liquidity concerns around that time (see also Box 8), which abated considerably in the new year. By contrast, the 12-month rate remained high across the year-end and into 2008, particularly towards the end of the first quarter.

While deposit-OIS spreads should contain premiums for credit and liquidity risk, their weight in the overall spread depends on the maturity. Shorter maturities, such as one and three-month

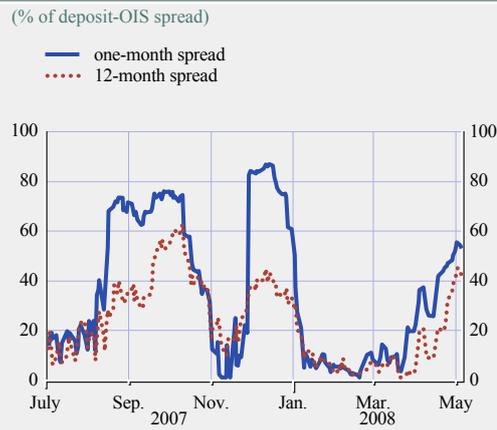
1 It should be noted that the term unsecured interbank market is typically of limited size and liquidity. The ECB's Money Market Study, using data from Q2 2007, estimated that just 1.3% of the unsecured market is traded for maturities beyond three months.

2 Several other studies also analyse these issues in more depth. See, for example, IMF (2008), "Chapter III: Market and Funding Illiquidity: When Private Risk Becomes Public", *Global Financial Stability Report*, April, F.-L. Michaud and C. Upper (2008), "What drives interbank rates? Evidence from the LIBOR panel", *BIS Quarterly Review*, March, and T. Wu (2008), "On the Effectiveness of the Federal Reserve's New Liquidity Facilities", Federal Reserve Bank of Dallas Working Paper, No. 0808, May. The conclusions of these studies broadly concur with those of this particular analysis.

**Chart A One-month euro area deposit-OIS spread decomposition into credit and non-credit (mainly liquidity) components**



**Chart B Proportion of the non-credit component in the euro area deposit-OIS spread**



Sources: Bloomberg and ECB calculations.

Note: The proxy for the credit premium was the CDS spread on investment-grade debt of euro area LCBGs. Both components were obtained with a constrained linear optimisation. The following restrictions were imposed: the credit component should deviate from the CDS spread as little as possible; both components have to be non-negative and add up to the deposit-OIS spread.

shown in Chart 3.2, typically reflect a greater degree of liquidity risk than longer maturities and the opposite applies to credit risk.

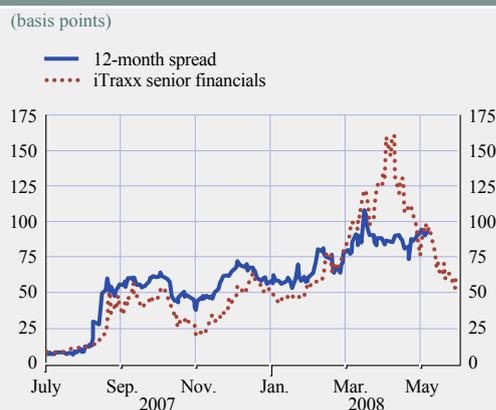
As an example, a decomposition of the one-month deposit-OIS spread into credit and non-credit components is presented in Chart A, whereas Chart B shows the proportions of the non-credit component in one and 12-month spreads. The non-credit component can be considered to be associated mainly with the liquidity premium. Its share in the one-month spread tended to be higher than in the 12-month spread, particularly at the outset of the turmoil and around the year-end.

As shown in Chart A, prior to the emergence of the turmoil in August 2007 the non-credit premium was negligible in size and the credit premium was close to the spread. In August, however, both increased markedly but followed quite different paths. The path of the non-credit premium highlights that liquidity concerns were substantial in the early weeks of the turbulence, contributing significantly to the deposit-OIS spread. After the resumption of heightened tensions around year-end, these concerns appeared to abate considerably in early 2008. At the same time the credit premium remained elevated and in the first three months of 2008 accounted for the major part of the spread. This suggests that during this period the spread was mainly driven by credit rather than liquidity concerns. However, as shown also in Chart B, this has changed somewhat since April 2008. By early May, the proportion of the non-credit premium had increased and accounted for approximately half of the spread. This implies that concerns have once again shifted to liquidity risk.

To highlight the credit risk component of the deposit-OIS spread, Chart C shows the 12-month spread and the iTraxx senior financials index based on the basket of credit default swaps on senior bonds of 25 European banks. This index is lagged by 18 days and its leading property remains to be explained. However, the strong correlation is clear from the chart.

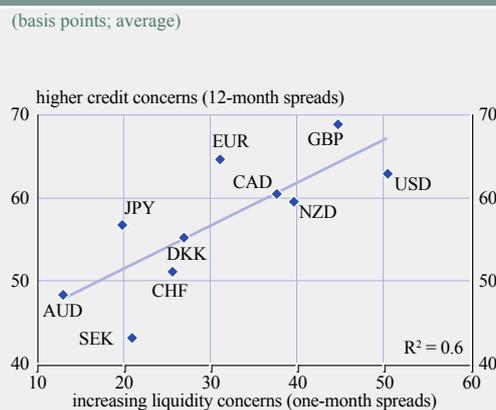
Chart D shows the average one-month spread versus the average 12-month spread for ten major money markets during the turmoil period. This international comparison highlights the positive

**Chart C Deposit-OIS spread and the iTraxx senior financials index**



Source: Bloomberg.  
 Note: iTraxx senior financials index lagged by 18 days.

**Chart D One-month versus 12-month deposit-OIS spreads: country comparison**



Sources: Bloomberg and ECB calculations.

relationship between liquidity and credit risks under the assumption that the former is stronger for shorter maturities and vice versa for the latter. It also serves to underline differences in the nature and extent of tensions in international money markets throughout the turmoil. In general, the euro, UK, Canadian and US markets seem to have been most affected, recording the highest spreads, while the Australian and Swedish markets showed the least signs of tension. However, Chart D also suggests that with credit concerns of the same magnitude, liquidity concerns have been lower in the euro area money market than in the UK, Canadian and US markets.

A tentative conclusion that could be drawn from the analysis is that concerns about credit risks have had a significant impact on money markets, and that they have persisted since the outset of the market turmoil. By contrast, liquidity risks have varied throughout the turbulence, but still remain significant and seem to have been increasing recently.

Turning to the market for short-term securities, it remained disrupted after the finalisation of the December 2007 FSR, when elevated yields, shortening maturities, and contracting markets were characteristic. After that, markets became increasingly selective and discriminatory in terms of issuers and instruments.

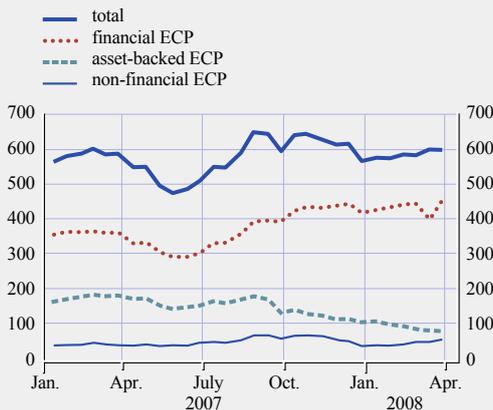
Some stability returned to the euro commercial paper (ECP) market in October and early November, reflecting developments in the euro and US money markets at that time. Total market size remained largely unchanged, despite a continuous decline in the asset-backed segment of this market; the non-financial sector also shrank, although this must be seen in the context of rapid growth in this segment in the latter half

of 2007, perhaps reflecting increasing borrowing costs for non-financials and an unwillingness on the part of investors to buy financial or asset-backed paper during this time.

As the year-end approached, and in tandem with heightening tensions elsewhere, the ECP market shrank once again (see Chart 3.3). Large decreases were seen across all market segments, but particularly in euro-denominated paper – another sign of the growing discrimination in the market. These developments contrasted with those in the United States, where commercial paper markets recovered modestly. Together, these events point to continued selectivity in the market. In keeping with these developments, amounts outstanding decreased

**Chart 3.3 Total amounts outstanding in the euro commercial paper (ECP) market**

(Jan. 2007 – Apr. 2008; € billions)



Source: CPWare.

in the ECP market, although original maturities continued to improve, with the exception of the asset-backed sector, again suggesting poor investor interest in this segment.

The turn of the year saw further stabilisation in the market, with the exception of asset-backed euro commercial paper (ABECP) which continued to decrease in size, with totals outstanding down by almost 50% after peaking in August 2007. Average maturities peaked over the year-end, as anticipated, but then returned to more normal levels for the market. Again the exception was the ABECP segment, where original maturities in the new year reached levels as low as those seen in August and September.

The latest data for these markets show that the total market size remained stable, gaining slightly to the end of February. Growth was again seen in the non-financial sector, possibly highlighting heightening tensions, but the ABECP sector continued to decline, while original maturities continued to improve. Again, these results contrast somewhat with developments in the United States, where there was a general decline in the commercial paper markets.

The short-term European paper (STEP)-labelled market, a subset of the overall ECP market, showed a different pattern to general developments. It posted large increases during the turmoil period, and it appears that issuance activity increased at this time. This supports the view that participants were highly selective in this market, and for some issuers, including those benefiting from the transparency required for participation in STEP, the turmoil was not as challenging as overall developments may suggest.

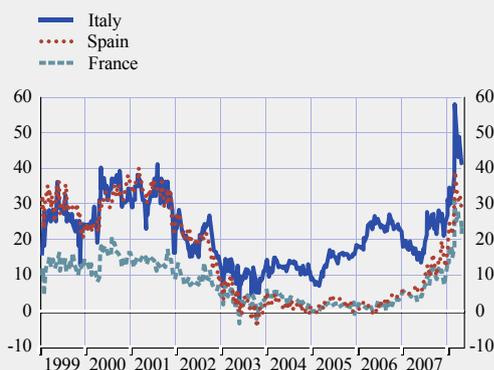
The difficulties experienced in the commercial paper markets were mirrored to some degree in the market for medium-term notes (MTNs); these products bridge the gap between long-term bonds and short-term securities, having typical maturities of nine months to ten years. Such developments may be a cause of concern, as MTNs offer market participants, including private banks, a source of medium-term funding, which, if disrupted, may force further reliance on an already challenging market for short-term funding.

Towards the end of 2007 and early in the new year, issuance of euro medium-term notes (eMTNs) by private banks and structured investment vehicles (SIVs), which themselves invest in MTNs, dropped sharply. While amounts issued by SIVs continue to decline, latest data show a substantial recovery in issuance by private banks, suggesting that this source of funding remains open. It should be noted, however, that large amounts of eMTNs will mature in the second half of 2008. While this reflects the growth in this market in recent years, it also highlights a potential source of funding pressure later in the year if the current climate persists and issuers have difficulty in re-issuing paper.

Although money market spreads are currently elevated, the levels of spreads in longer maturities are a source of ongoing concern and are an indication of heightened credit risk concerns. Such concerns are likely to inhibit investor

**Chart 3.4 Intra-euro area yield spreads on ten-year government bonds**

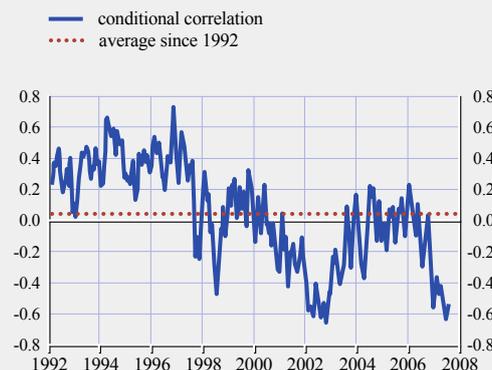
(Jan. 1999 – May 2008; basis points)



Source: Bloomberg.  
Note: The chart shows ten-year yield spreads relative to Germany for the three largest euro area economies after Germany.

**Chart 3.5 Conditional correlation between daily euro area bond and stock returns**

(Jan. 1992 – May 2008; 20-day averages)



Sources: Reuters, Thomson Financial Datastream and ECB calculations.  
Note: Estimated using a multivariate GARCH model. Stock returns are based on the Dow Jones EURO STOXX index and bond returns on the ten-year Datastream bond index for Germany.

interest in ABCEP, and further shrinkage of this market may occur, notwithstanding positive developments in other segments of the ECP market.

### 3.2 KEY DEVELOPMENTS IN CAPITAL MARKETS

#### GOVERNMENT BOND MARKETS

Government bond yields in the euro area underwent considerable fluctuations between early November and early May (see Chart S73) as the market turbulence began to affect these markets more strongly than in the turmoil's earlier phases. One symptom of this was a notable widening of intra-euro area government bond yield spreads (see Chart 3.4). Although comparable sovereign CDS premiums also widened, which suggests at least some element of increased credit risk premium, the principal reason for this was deterioration in liquidity in many euro area government bond markets, exacerbated by the unwinding of carry positions by leveraged investors due to margins calls and efforts to reduce leverage.

Moreover, short to medium-term swap spreads widened further, which is indicative of

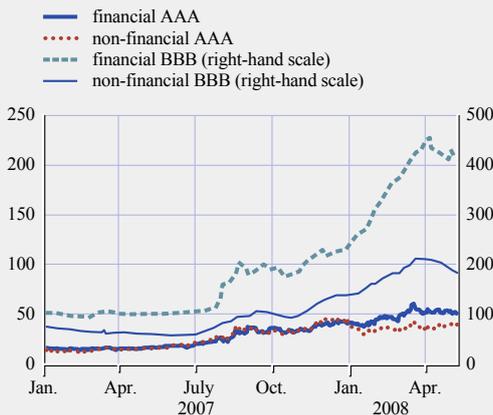
downward pressure on government bond yields emanating from investors' increased preference for safe and liquid assets. The sharp steepening of the euro area yield curve in February (see Chart S73) appears to be partly attributable to "flight-to-quality" effects, which were also evident in an unusually strong negative correlation between stock and bond returns in recent months (see Chart 3.5).

#### CREDIT MARKETS

After the finalisation of the December 2007 FSR, credit spreads on euro area corporate bonds continued to widen sharply across all rating classes (see Charts S81 and S82). With the exception of the high-yield segment, corporate bond spreads reached their highest levels since 1999. It is, however, of key importance to distinguish between financial and non-financial issuers in these markets. Both in absolute and relative terms, the increases in corporate credit spreads were most pronounced for financial corporations (see Chart 3.6). By contrast, non-financial corporations with high credit ratings experienced a stabilisation or even a tightening of spreads, while lower-rated non-financials were confronted with non-negligible increases in their bond market borrowing costs.

**Chart 3.6 Financial and non-financial corporate bond spreads in the euro area**

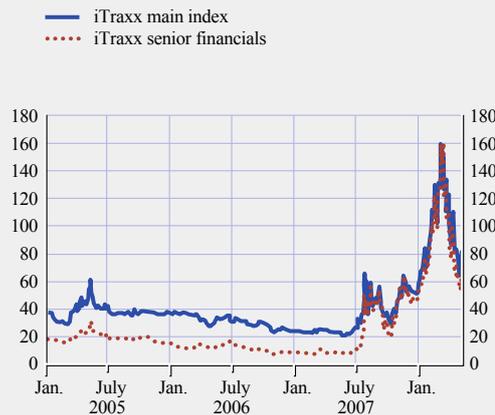
(Jan. 2007 – May 2008; basis points)



Source: Reuters.

**Chart 3.7 iTraxx main and senior financials indices**

(Jan. 2005 – May 2008; basis points; five-year maturity)



Source: Bloomberg.

The wider spreads may reflect concerns that some euro area non-financial corporations could face increasing difficulties in financing and refinancing their operations in the coming quarters. More specifically, if the stress in the banking sector continues for several quarters, firms may find it more difficult to roll over maturing short-term debt as well as covering new financing needs. It is likely that this would eventually result in increasing default rates (see Chart S53). There are indeed some signs that the euro area credit cycle may now have turned (see Box 7).

Weaker investor demand for bonds issued by financial institutions reduced liquidity in the European covered bond market. This led to a temporary suspension of the inter-dealer market and to a significant widening of bid-ask spreads. Conditions in the covered bond market continue to be tense, with spreads still wide and most new issues being of shorter maturities.

The significant repricing of credit risk also pushed iTraxx CDS indices to all-time highs for all credit rating categories (Chart S83). The largest increases in CDS premiums were seen in the financial sector (see Chart 3.7). The repricing of risk for European banks was fairly homogeneous, despite widespread uncertainty

about the actual dispersion of risks on banks' balance sheets.

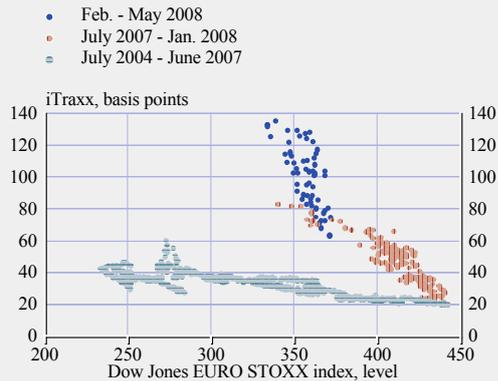
Beyond the financial sector, the turmoil had a significant impact on CDS premia in most other industries, in particular the cyclical ones. Credit risk premia rose to all-time highs in those sectors, reflecting rising macroeconomic risk (Chart S85).

In addition to concerns over the risks on banks' balance sheets and over the macroeconomic outlook, CDS indices were reportedly pushed upwards by some important technical factors, in particular by the actual or rumoured unwinding of credit structures, such as synthetic collateralised debt obligations (synthetic CDOs) and constant proportion debt obligations (CPDOs).

CPDOs are a good illustration of investors' over-reliance on credit ratings and of the appetite for complex high-yielding products which prevailed before the start of the market turmoil in the summer of 2007. These products provide investors with a leveraged exposure to CDS indices, while keeping a very good credit rating. They include an automatic stop-loss when their net asset value declines below a certain threshold. The sharp repricing of credit

**Chart 3.8 Relationship between the Dow Jones EURO STOXX and the iTraxx main index**

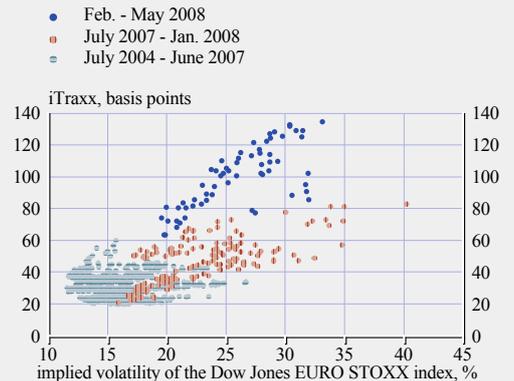
(July 2004 – May 2008; index levels and basis points)



Source: Bloomberg.

**Chart 3.9 Relationship between the implied volatility of the Dow Jones EURO STOXX and the iTraxx main index**

(July 2004 – May 2008; % and basis points)



Source: Bloomberg.

risk resulted in losses on these products which were significant enough to trigger the stop-loss, fuelling further increases in CDS indices.

Indirect evidence of the significance of factors specific to the credit derivative market was provided by the changes in the relationship between equity markets and credit default swaps. When the turmoil started in the summer of 2007, the relationship between European CDS indices and equity prices changed, as a result of the sharp repricing of credit risk (see Chart 3.8). More recently, after February 2008 the relationship between CDS indices and equity implied volatility changed too, probably as a result of technical factors such as the unwinding of credit structures (see Chart 3.9).

After mid-2007 the number of LBO deals and issuance volumes of leveraged loans declined sharply, which compared with only a moderate decrease in collateralised loan obligation (CLO) issuance and even some signs of recovery in the fourth quarter of 2007. Although this type of structured product suffered from risk-repricing over the last couple of months as in many other parts of the structured credit market, CLO spreads widened by less than those of CDOs backed by sub-prime loans, when comparing across the tranches of the same rating. This indicates that investors started to discriminate on the basis of risk, showing a preference for simpler CLO structures as opposed to other types of structured products.

**Box 11**

**FINANCIAL STABILITY IMPLICATIONS OF THE DRYING-UP OF SECURITISED COMMERCIAL MORTGAGE MARKETS**

Amid the turbulence in credit markets, and in particular structured credit markets, after the summer of 2007 the issuance of commercial mortgage-backed securities (CMBS) came to a halt in Europe, eventually resuming at more modest issuance volumes. With lowered investor appetite for these securities, opportunities for banks to spread commercial property loan exposures were reduced. This, in turn, reduced their willingness to lend for commercial property development

and ownership. In addition, it led to revenue decline and exposures to “hung loans” for investment banks that originated commercial property loans with the aim of distributing them as structured credit products. These negative developments came at a time when commercial property markets in the euro area – at least in some countries – started to show signs of deterioration (see Section 2.3). Thus, the structured commercial mortgage market and the direct commercial property ownership and development market have the potential to negatively affect each other. This box provides a brief overview of the CMBS market in Europe and it identifies the main risk propagation channels from this market from a euro area financial stability viewpoint.<sup>1</sup>

Banks’ loans for development and ownership of commercial property account for around 8% of total bank lending and around 27% of total lending to non-financial corporations in the euro area, although these shares vary considerably across countries. High construction activity and large volumes of direct investment in commercial property witnessed in recent years in the euro area, which were, in large parts, debt-financed, created a need for banks to spread some of the related credit risk via debt securities. In 2007 roughly 10% of all bank loans in the euro area extended for commercial property purposes were securitised.<sup>2</sup> This credit risk transfer was achieved mainly by means of the issuance of CMBSs, which are a type of bond issued in securities markets and backed by mortgages on income-generating properties.<sup>3</sup> Such securities were first introduced in the United States in the early 1990s, when they were used to clean up bad loans.

Issuance of CMBSs in Europe has grown rapidly in recent years (see Chart A), and the issued amount totalled €48 billion in 2007.<sup>4</sup> The United Kingdom is the largest market for CMBSs in Europe, but activity in euro area countries was increasing before the recent turmoil erupted. In Germany, for example, the total value of CMBS issuance was about 400% higher in 2006 than in 2005, mainly because of the sale of large housing portfolios.<sup>5</sup> However, in the latter part of 2007, due to lowered demand for structured credit products coupled with an uncertain outlook for commercial property markets, issuance of CMBSs came to a halt. Issuance activity in the euro area during the last quarter of 2007 dropped to €2 billion from €6.2 billion one year earlier. Also, expectations among some market participants are that issuance volumes in 2008 will be sharply down on those of 2007 both in the United States and in Europe. Estimates show issuance falling by between 36% and 89% to levels last seen in the mid-1990s (see Chart A).<sup>6</sup> Indeed, European CMBS issuance activity during the first quarter of 2008 was approximately 7% of the level in the same quarter the previous year.<sup>7</sup> Reduced investor demand for these products was also shown in CMBS spreads, which rose sharply after the summer of 2007, and banks’ costs for selling on commercial mortgage exposures have thus increased substantially (see Chart B).

1 Lately, commercial mortgage CDOs have joined CMBS transactions as an additional vehicle for the financing of commercial real estate. These can be backed either by rated collateral, such as CMBSs, or by commercial real estate loans.

2 Estimation based on various national sources and ECB lending data for monetary financial institutions (MFIs).

3 See also ECB (2007), “Commercial property investment and financial stability”, *Financial Stability Review*, December. Among the asset types, mortgages on office and retail properties are the largest underlying assets.

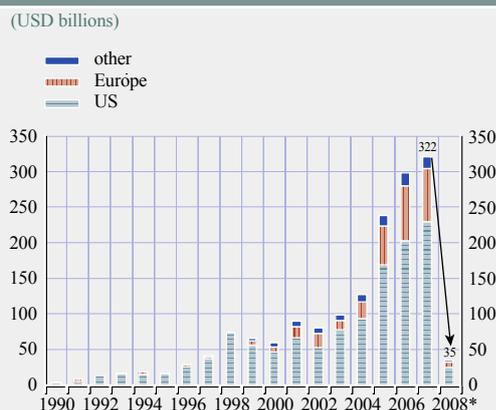
4 See European Securitisation Forum (2008), “ESF Securitisation 2008 Market Outlook”.

5 See Moody’s (2007), “2006 Review and 2007 Outlook: EMEA CMBS: Another record year with tremendous growth in the German CMBS and multifamily market”, January.

6 See European Securitisation Forum (2008), “ESF Securitisation 2008 Market Outlook” and Morgan Stanley (2007), “CRE Differentiated: Avoid Mark to Market Risk & CMBS Flow: But Rental Cash Flows”, December.

7 See JP Morgan Chase & Co (2008), “European ABS Weekly”, 31 March and 21 April.

**Chart A Commercial mortgage-backed securities issuance and forecast**



Source: Morgan Stanley.  
Note: Data for 2008 are forecasts (marked with \*).

**Chart B Commercial mortgage-backed securities spreads in Europe**

(spread over EURIBOR in basis points; AAA-rated securities)



Source: JPMorgan Chase & Co.

The main investors in structured commercial mortgage products are specialised money managers, banks and SIVs. These investors were attracted by, among other things, attractive returns, the high ratings of the structured products and diversification benefits, as CMBSs typically have exposure to a number of loans extended for a wide variety of property types in different geographical regions.

Four main risk propagation channels from lower CMBS issuance can be identified: i) credit risk exposures of banks to commercial property loans may increase and higher impairment charges might be needed to cover bad loans where commercial property is used as collateral; ii) banks and other investors holding CMBSs might face losses due to falling values of structured credit products referencing commercial property loans to the extent that they have invested in such products; iii) investment banks that generate fee income by arranging CMBSs are facing lower revenues and some banks could face further markdowns (due to wider spreads) on collateral originated for securitisation that has stayed on the banks' balance sheets (i.e. under the buy-and-distribute business model); and iv) commercial property companies might face problems in obtaining bank finance at a time when banks are tightening lending standards, and increased costs of lending could put pressure on the income of commercial property owners. This could, in turn, negatively affect commercial property prices.

All in all, in recent years CMBSs have become popular among banks seeking to transfer credit risks stemming from commercial mortgage loan portfolios. Such credit risk reduction activities on the part of banks are, in general, positive from a financial system stability perspective, as they can reduce banks' exposure to credit events in commercial property markets. However, as has been seen during the recent drying-up of these markets, banks are vulnerable to a reduction in investor demand for these products. Looking ahead, market participants are of the view that the drying-up of the CMBS market is a cyclical pause rather than an end, and that issuance going forward will be characterised by simpler and more conservative collateral structures. The prospect of a recovery in CMBS issuance activity in the future is also supported by the fact that, although commercial property markets in some euro area countries are showing signs of

deterioration, delinquency and default rates on commercial property loans have remained low and are expected to rise only modestly going forward. This viewpoint is supported by low downgrade pressure from the rating agencies.

The end-of-year pick-up in issuance of CLOs was also possibly due to an increasing willingness of banks to sell higher volumes of warehoused loans, even at large discounts. A possible pick-up from the historically low levels of default rates could trigger substantial amounts of losses arising from exposure to leveraged loans among investors.

### EQUITY MARKETS

In the last few months of 2007 euro area equity markets remained largely unaffected by the turbulence in global credit markets. In January 2008, however, investors began to demand higher compensation for risks and prices declined sharply (see Chart S75). In line with recent survey evidence (see Chart S44), this also suggests that investors have become more pessimistic about the outlook for both euro area and global economic growth.

Short-term equity market risk, as measured by option-implied volatility (see Chart S76), spiked in January and again in March. Since then the

perceived riskiness of equities has fallen back to pre-turmoil levels amid the gradual moderation of equity market fluctuations. This may reflect a perception among investors that equity prices have reached a more sustainable level after a series of downward corrections.

Although the financial sector has been at the epicentre of the ongoing turbulence, in the six months after the cut-off date for the December 2007 FSR the correction observed in euro area equity prices was rather broad-based and not confined to financial stocks alone. Although an increasing equity risk premium, adverse exchange rate (see Charts S20 and S21) and commodity price movements (see Chart S40) have also played a role, this seems to imply that investors expected some spillover from the financial turmoil to the profitability of euro area non-financial corporations.

In terms of valuations, financial stocks do stand out, however, and are trading at rather low multiples of past earnings (see Chart 3.10). While price-earnings ratios for banks based on trailing earnings reached relatively low levels, they seem to mainly reflect an assessment that financial sector earnings growth will slow down in the period ahead. At the same time, non-financial corporations also had somewhat lower P/E multiples than six months ago.

The dispersion of sectoral price-earnings (P/E) ratios in the euro area increased in the fourth quarter of 2007 (see Chart 3.11), driven mainly by the repricing of financial stocks. The dispersion among non-financial corporations, however, remained very uniform across sectors. Although this picture has essentially remained unchanged over the past couple of years, it is nevertheless noteworthy that it persisted amid the recent risk repricing and worsening of the economic outlook.

**Chart 3.10 Price-earnings (P/E) ratios for AAA-rated euro area financial and non-financial companies**

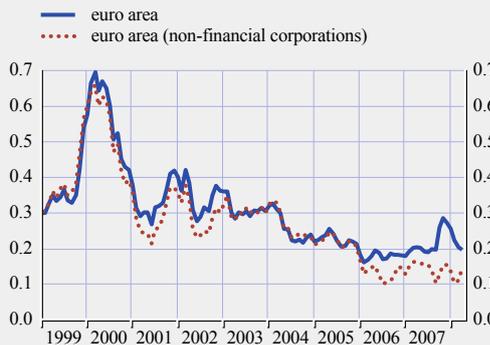
(Jan. 1999 – Apr. 2008)



Source: Thomson Financial Datastream.  
Note: MSCI EMU P/E ratio based on reported earnings.

**Chart 3.11 Dispersion of price-earnings (P/E) ratios across sectors in the euro area**

(Jan. 1999 – Apr. 2008; standard deviation divided by the average)



Sources: Thomson Financial Datastream and ECB calculations. Note: P/E ratios are based on the reported earnings of ten economic sectors of the MSCI EMU index.

In addition to a considerable increase in available measures of the euro area equity risk premium, and high readings of survey-based measures of risk aversion (see Chart S18), indications of decreased demand for equity risk could also be found in the sharp reversal of net inflows into equity funds linked to European equities (see Chart 3.12).

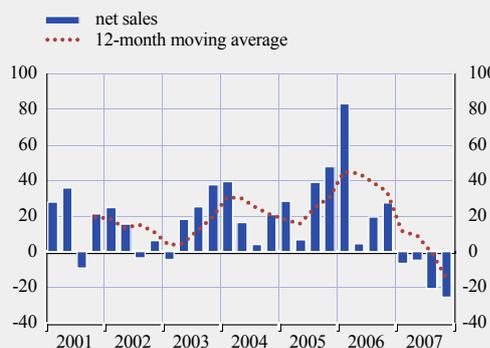
Probably also reflecting the weaker demand for equity exposure, the latest available data on net issuance of quoted shares in the euro area show some decline from the peaks observed in

the spring of 2007, especially for non-financial corporations.

Looking ahead, it can be expected that moderating economic growth, adverse exchange rate developments and tighter access to credit will weigh on euro area corporate earnings growth in the coming quarters. It is therefore not unlikely that analysts' rather optimistic expectations for earnings (see Chart 2.5) may fail to materialise.

**Chart 3.12 Net inflows into European equity funds**

(Q1 2001 – Q4 2007; € billions)



Source: European Fund and Asset Management Association. Note: Figures refer to net sales of equity funds linked to the Dow Jones STOXX 600 index.

#### 4 THE EURO AREA BANKING SECTOR

*The financial results of euro area large and complex banking groups (LCBGs) for 2007 show that most of these institutions suffered significant declines in net income during the last two quarters of the year. Despite the falls in income, which mainly reflect write-downs of exposures to securities affected by the financial market turmoil, solvency measures at the end of 2007 indicated a reasonable amount of remaining shock absorption capacity among these institutions. Looking ahead, as spillovers to asset markets and the real economy play themselves out, it can be expected that the profitability of the euro area banking sector in 2008 will be adversely affected. Moreover, it cannot be ruled out that credit losses could also start increasing for LCBGs. Reflecting this view, market indicators are currently pricing in substantial near-term risks for euro area LCBGs, although some of the indicators have shown a slight recovery since the end of the first quarter of 2008.*

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

The continued strengthening of the profitability of euro area LCBGs in the first half of 2007, after several years of improvement, positioned most of them relatively favourably to weather the market turbulence that ensued in the second half of the year. As expected, the turbulence acted as a drag on profitability both through mark-to-market valuation losses and increased impairment charges on loans and securities. Consequently, it reduced the ability of banks to generate capital internally through retained earnings. That said, the risk-bearing capacity of LCBGs was still assessed as satisfactory in early 2008, notwithstanding a background of very difficult market conditions.

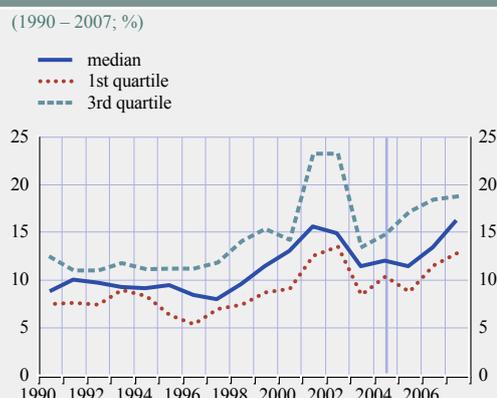
The market turbulence that erupted in August 2007 has put a significant dent in the largely positive performance of euro area LCBGs since 2004. When recalling previous bank earnings cycles, several stylised facts emerge which help to put recent developments into perspective. First,

when compared with previous peaks, the return on equity (ROE) of euro area LCBGs in 2007 was the highest seen since 2001, in spite of the impact of the turbulence in the second half of the year (see Chart 4.1). Second, although there is a persistent disparity in performances between poorly performing banks and banks with return on equity at the upper end of the distribution, the gap remained narrower than when euro area banks last faced a challenging environment in 2003.

It is notable that there was wide variation in the impact of the turbulence during the second half of 2007 on the financial performance of institutions through mark-to-market valuation losses as well as other turbulence-related charges taken through the profit and loss accounts. For instance, several euro area LCBGs endured significant losses in the second half of 2007 which overwhelmed the strength of their performances in the first half of the year (see Chart 4.2). By contrast, a sizeable number of institutions were largely unaffected by the turbulence. For these institutions, neither full-year net after-tax income nor shareholders' equity was affected.

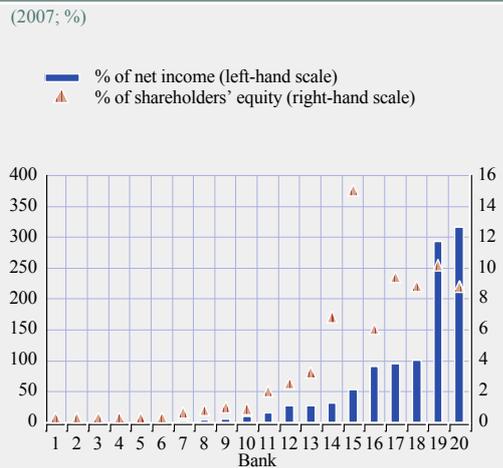
<sup>1</sup> For a discussion on how euro area large and complex banking groups are identified, see Box 10 in ECB (2007), *Financial Stability Review*, December. At the time of analysis, not all figures were available for all banks.

**Chart 4.1 Return on equity of listed large and complex banking groups in the euro area**



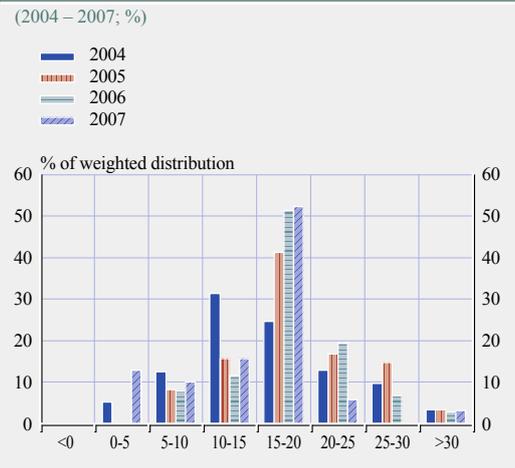
Sources: Thomson Financial Datastream and ECB calculations. Note: The number of listed institutions included varies over the period due to mergers and acquisitions. The grey vertical line marks the introduction of IFRS accounting standards which marked a break in the series.

**Chart 4.2 Impact of the turbulence on full-year 2007 net income of large and complex banking groups in the euro area**



Sources: Individual institutions' financial reports and ECB calculations.

**Chart 4.3 Frequency distribution of return on equity of large and complex banking groups in the euro area**



Sources: Individual institutions' financial reports and ECB calculations.

Net interest income of euro area LCBGs continued to be squeezed in the second half of 2007 despite further volume growth in lending. As a result, the predominant source of income growth was from non-interest income sources. Continuing a pattern noted in the December 2007 FSR, increases in risk-weighted assets through balance sheet expansion and, in some cases, because of takeovers of other banks, led to slight declines in solvency ratios<sup>2</sup>. In some individual institutions, growth in risk-weighted assets reflected re-intermediation of assets that were previously held in off-balance sheet structures, as well as a reduced ability to distribute newly originated assets, which resulted in a crystallisation of warehousing risk. However, despite the mark-to-market losses endured in the second half of 2007, banks' capital ratios remained well above regulatory minimums.

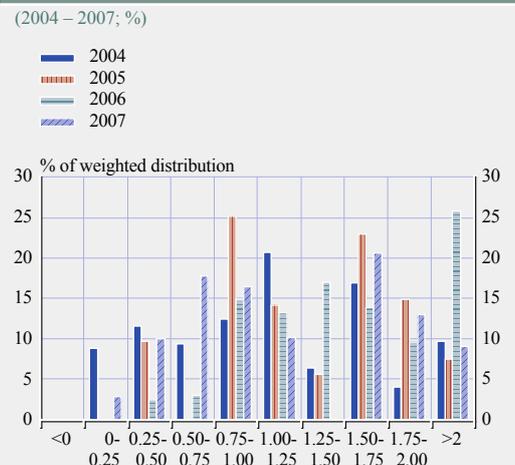
#### PROFITABILITY IMPACTED BY TURBULENCE

Primarily reflecting the negative impact of the market turmoil, the profitability of euro area LCBGs for the full-year 2007 fell for the first time since 2003. The full-year weighted average ROE for these institutions dropped from about 18.4% in 2006 to about 14.3% for the full year

2007. The smaller drop in the median ROE, from 17.7% to 15.4% over the same period, reflected the skewing of the losses across these institutions. Institutions in the lowest quartile

- In the latter case, this was due to the short-term growth in risk-weighted assets due to the increase in balance sheet size of the merged entity.

**Chart 4.4 Frequency distribution of return on risk-weighted assets for large and complex banking groups in the euro area**



Sources: Individual institutions' financial reports and ECB calculations.

of the profitability distribution also endured a significant decrease in their profitability from just over 7% in 2006 to under 3% in 2007 (see Chart 4.3 and Table S5).

Other measures of profitability such as return on risk-weighted assets (RORWAs) also declined in 2007. The weighted average return decreased from 1.55% in 2006 to just under 1.10% in 2007 (see Chart 4.4 and Table S5).<sup>3</sup> This was due both to weaker net income in 2007 and a sharp rise in risk-weighted assets as a result of growth in lending in emerging and other markets outside of home markets. Re-intermediation of assets

from off-balance sheet structures, as well as difficulties in securitising assets, also contributed to the growth in risk-weighted assets (see Chart S87 and Table S5).

<sup>3</sup> Risk-weighted assets (RWAs) are used to calculate regulatory (BIS-based) capital requirement ratios based on on-balance and off-balance sheet positions. They are computed by assigning each of the bank's assets and off-balance sheet items to several broad risk categories, each of which has different weights that increase with the level of risk, in order to calculate the denominator for the capital requirement ratios. The numerator of the capital is the euro amount of either Tier 1 capital or total capital.

#### Box 12

##### MARK-TO-MARKET ACCOUNTING AND THE LOSS FIGURES PRODUCED BY LARGE AND COMPLEX BANKING GROUPS

This box outlines the accounting and valuation concepts behind the recent figures disclosed by euro area LCBGs. Contrary to certain media reports the majority of these figures reflect valuation changes on securities held rather than impairments reflecting outright credit losses. In any event, there are inherent difficulties in comparisons across institutions due to differences in the methods and assumptions used to value these exposures.

The impact of the sub-prime crisis can be seen in the figures disclosed by banks in their financial statements in two main ways: valuation changes on various assets and increases in credit impairments. Most of the figures recorded in banks' accounts are valuation changes and relate to securities whose value has been adversely affected by the sub-prime turbulence. Under International Financial Reporting Standards (IFRS), euro area banks value these securities depending on the accounting category in which they were included at the time of recognition, namely: fair-value through profit or loss, available for sale (AFS) or held to maturity (HTM). According to reports from the LCBGs themselves, most sub-prime-related securities are accounted for under the first two categories. Those securities that were classified as "held for trading purposes", and thus included in the fair-value through profit or loss category, must be valued at market prices, if such prices are available, or through a valuation technique, if they are not. The resulting changes are reflected directly in the profit and loss account of the holding entity.

For securities included under AFS, the decline in value that does not constitute an impairment of the asset is reflected in changes in equity (in a special AFS reserve) and the loss is not taken through the profit and loss account until the asset is sold. Banks generally have considerable discretion regarding whether AFS assets are impaired, which may be one of the reasons why there was not a material increase in impairments in the third quarter of 2007.

In addition, where banks have marked to market their own issued liabilities, deterioration in their credit risk standing will have a positive effect and lead to an increase in equity as it reflects a lower value of this obligation.

Furthermore, the way in which banks calculate mark-to-market valuation changes and whether these valuation changes are comparable across banks have attracted increased attention in the current period. Before the turmoil, under IFRS, banks disclosed limited information concerning the amount and type of assets that were marked to model. This situation in the euro area is in contrast to the United States where new Generally Accepted Accounting Principles (GAAP) require certain disclosures concerning the portion of assets in a portfolio that are purely marked to model.<sup>1</sup> Large US financial institutions began to disclose these details during the course of 2007. In the meantime, however, most euro area LCBGs have also voluntarily revealed the scale of their actual exposures to holdings of sub-prime-related assets – including CDOs – in response to market developments and to considerations from their auditors.

<sup>1</sup> Under US GAAP accounting standards (SFAS 157), US financial institutions are required to classify these assets under a three-level hierarchy that gives the highest priority to quoted prices in active markets for identical assets or liabilities (Level 1) and the lowest priority to unobservable inputs (Level 3). In Level 2 reporting entities classify assets for which the only available inputs are other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly.

### NEGATIVE EFFECT OF TURBULENCE ON INCOME

Despite the increase in short-term market interest rate spreads in the euro area in 2007, net interest income as a percentage of total assets decreased slightly in 2007 as a whole to a weighted average of 0.76%, compared with just under 0.82% for 2006 (see Table S5 and Chart S88). On one hand, while the steepening of the euro area yield curve may have positively contributed to net interest margin expansion for some banks through increasing loan margins (see Chart S94), the effect on total operating income may have been attenuated by the fact that net interest income represented only about 50% of total operating income for euro area LCBGs. Furthermore, deposit margins (i.e. the spread of weighted deposit rates over corresponding swaps) have declined due to the impact of the turbulence on the swap market (see Chart S98). Finally, some of the positive impact on banks' net income overall from a steepening yield curve could be offset by increased impairments in the period ahead. However, overall, it appears that volume growth in lending over the course of 2007 was not sufficient to compensate for declining margins.

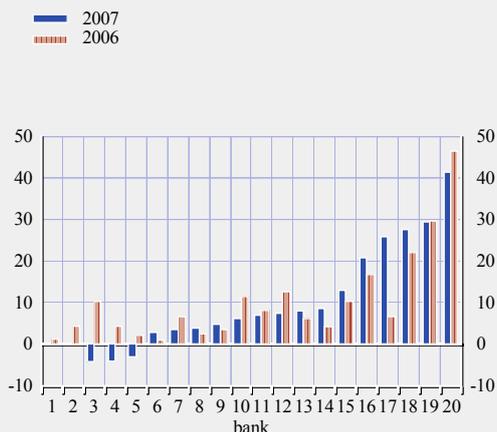
Although slowing down to some extent, growth in fee and commission income remained the most important source of non-interest income for euro area LCBGs. There was a slight increase in the share of this income item in net operating income to about 30% in 2007 from about 29.5% in 2006.

As mentioned in previous editions of the FSR, capital market conditions had been very favourable for several years prior to the eruption of the market turbulence. This had underpinned strong trading revenues but there had been doubts as to whether these could be sustained in the medium term. As shown in Chart 4.5, for some banks the main impact of the turbulence in the second half of 2007 on net income came from declines in trading revenue.

Trading income performances for the full year in 2007 demonstrated the volatility of this income source. In relation to Tier 1 capital it fell substantially for some institutions in 2007 when compared to 2006 (see Chart 4.5). For a number of institutions it was even negative, representing outright trading losses. Nevertheless, several LCBGs saw an increase in their trading revenues

**Chart 4.5 Trading revenue as a percentage of Tier 1 capital for large and complex banking groups in the euro area**

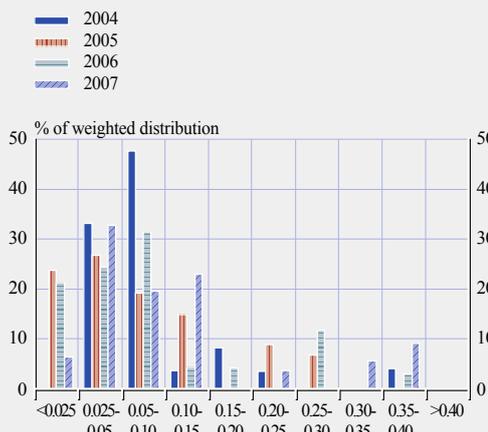
(2006 – 2007; %)



Sources: Individual institutions' financial reports and ECB calculations.

**Chart 4.6 Frequency distribution of net loan impairment charges for large and complex banking groups in the euro area**

(2004 – 2007; % of total assets)



Sources: Individual institutions' financial reports and ECB calculations.

overall in 2007, primarily due to growth in emerging markets and commodities-related trading. Median trading revenue as a percentage of Tier 1 capital increased slightly from 6.5% in 2006 to 7.1% in 2007.

### CREDIT COSTS BEGINNING TO INCREASE

Credit costs – or impairment charges as they are known under IFRS – increased in 2007 compared with 2006. While recently reported levels of loan impairment charges by euro area LCBGs remain low by historical standards, the weighted average loan impairment charge increased slightly from 0.09% of total assets in 2006 to around 0.11% in 2007 (see Chart 4.6 and Table S5). The main underlying reasons for this increase were the continued effect of mergers, as banks with a significant level of loan impairments were taken over, and increased retail lending in overseas markets where euro area LCBGs are active (including eastern Europe and South America).<sup>4</sup>

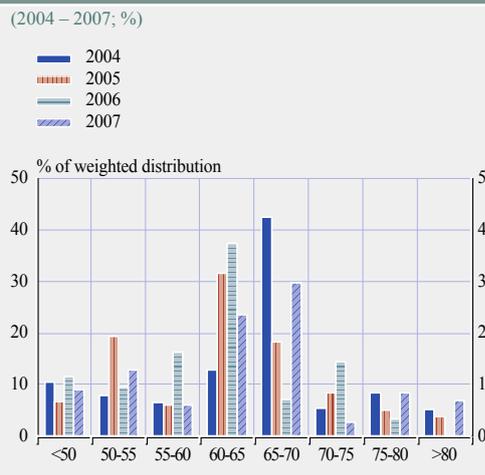
As the accounting results for 2007 reflect financial performances during the whole year, they reflect not only the impact of the recent credit market turmoil but also the pre-turmoil period during the first half of the year when impairments were extremely low. While

some of the impairment charges at individual institutions already reflected the adverse credit quality impact of the turbulence in the 2007 accounts, it cannot be ruled out that overall impairments may increase further and become more widespread in the period ahead.<sup>5</sup>

In terms of operating efficiency, cost-to-income ratios increased slightly among euro area LCBGs in 2007, as the growth in operating income was outpaced by growth in operating costs. This was primarily due to a reduction in operating income and integration-related costs following mergers. The weighted average cost-to-income ratio increased from about 61.1% in 2006 to 61.7% in 2007. The more poorly performing institutions' cost-to-income ratios increased from 54.8% in 2006 as a whole to 55.3% for 2007 (see Chart 4.7 and Table S5).

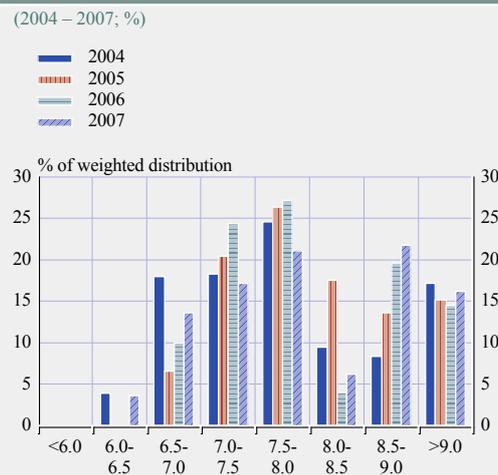
- 4 For some institutions, there was a decline in the amounts of write-backs of loans reflecting a lower degree of work-outs of loans that were previously classified as impaired. This is because gross impairment data purely indicate the flow of new impairment charges. The net impairment figure, which is the sum of new impairments plus reversals of previously impaired loans, is not yet available on a comparable basis for the entire sample of the euro area LCBGs.
- 5 In some individual cases, impairment charges could also have been affected by pro-active measures taken in the form of dynamic provisioning.

**Chart 4.7 Frequency distribution of cost-to-income ratios for large and complex banking groups in the euro area**



Sources: Individual institutions' financial reports and ECB calculations.

**Chart 4.8 Frequency distribution of Tier 1 ratios for large and complex banking groups in the euro area**



Sources: Individual institutions' financial reports and ECB calculations.

### CAPITAL RATIOS DECREASED BUT REMAIN ABOVE REGULATORY MINIMA

The continuous strengthening of profitability over recent years had allowed banks to retain profits which contributed positively to their capital ratios. Against this positive trend, recent turbulence-related reductions in retained income, as well as increases in risk-weighted assets, led to a slight weakening of the weighted average euro area LCBG Tier 1 ratio from 8.13% in 2006 to 7.78% in 2007 (see Chart 4.8). As discussed earlier, there were several reasons for the growth in risk-weighted assets, such as increased lending commitments, merger activity, and re-intermediation of some assets previously held off balance sheet.

Developments in overall solvency ratios also mirrored those in Tier 1 ratios. The overall solvency ratio declined slightly from a weighted average of 11.35% in 2006 to just over 10.42% in 2007 (see Chart S92 and Table S5). For both ratios, the solvency of the most poorly performing institutions weakened further, indicating a slight decline in the shock absorption capacity of these institutions. Nevertheless, both solvency measures exceeded

the respective regulatory minima for these capital ratios for all euro area LCBGs at the end of 2007, which indicates a reasonable amount of remaining shock absorption capacity among these institutions.

### 4.2 BANKING SECTOR OUTLOOK AND RISKS

Compared with the situation at the time of finalisation of the December 2007 FSR, the short-term outlook for the profitability of euro area LCBGs has deteriorated on account of the persistence of the financial market turmoil. In particular, revenues are expected to remain under pressure and further market-to-market losses are expected to materialise. Furthermore, credit costs could increase should the actual corporate sector default rates rise in the euro area as currently suggested by forecasts and market indicators. The way the banks will respond to a much more challenging operating environment partly depends on the extent to which initiatives and measures – both by policy-makers around the world and by the financial industry itself – which are aimed at restoring confidence in and strengthening the resilience of financial systems are eventually implemented (see Box 13).

## Box 13

**INITIATIVES AND MEASURES THAT ARE BEING TAKEN IN ORDER TO RESTORE CONFIDENCE AND STRENGTHEN FINANCIAL SYSTEM RESILIENCE**

The turmoil in mature economy financial markets has revealed a number of weaknesses in the existing regulatory and supervisory framework worldwide. In response, competent authorities, international organisations as well as market participants themselves have launched several initiatives to identify the major causes of the turmoil and to develop responses aimed at restoring confidence and at strengthening the resilience of the financial system. In this connection, this box provides an overview of three streams of work that deserve special attention: the roadmap of the ECOFIN Council; the recommendations of the Financial Stability Forum (FSF); and initiatives that are being taken by the private sector.

**The ECOFIN roadmap:** at the EU level, the ECOFIN endorsed in October 2007 a roadmap, defining a list of actions in relation to the financial turmoil that are scheduled to be completed in 2008. The Council identified four priority areas for action: (i) enhancing transparency; (ii) improving valuation standards; (iii) reinforcing prudential rules and risk management in the financial sector; and (iv) improving market functioning. After the cut-off date of this issue of the FSR, on 14 May, progress on the roadmap as well as on the timeline was reviewed by the ECOFIN Council, and policy priorities for the short and medium term were confirmed.

**The FSF recommendations:** at the international level, the G7 Ministers and Central Bank Governors requested in October 2007 the Financial Stability Forum to draw the relevant lessons from the financial turmoil and to set out policy recommendations, with the aim of increasing the resilience of markets and institutions. After intensive consultation with international bodies and national authorities, the Report of the FSF on Enhancing Market and Institutional Resilience was discussed and endorsed at the G7 meeting on 11 April 2008. The report contains 67 recommendations, grouped in the following five main areas: (i) strengthening prudential oversight of capital, liquidity and risk management; (ii) enhancing transparency and valuations; (iii) changes in the role and uses of credit ratings; (iv) strengthening the authorities' responsiveness to risks; and (v) dealing with stress in the financial system. Within these broad categories, specific issues are also to be addressed, such as assessing the cyclicity of the Basel II framework; improving liquidity management of financial institutions; enhancing central bank monetary policy operational frameworks and crisis management arrangements; as well as improving cooperation and the exchange of information between authorities that are of particular importance also for central banks.

**Private sector initiatives:** in response to the financial turmoil, the Institute of International Finance (IIF) set up a committee to explore market best practices, with the aim of addressing current weaknesses and strengthening financial institutions so that they are better equipped to deal with future challenges. The interim report of the IIF has revealed that deteriorating lending and underwriting standards; excessive reliance on poorly understood ratings of structured products; difficulties in the valuation of illiquid assets; inadequate appreciation of the adverse implications of liquidity and reputational risk exposure of conduits and structured investment vehicles for sponsoring banks; as well as difficulties in identifying the final bearers of risks, were

among the major sources of the turbulence.<sup>1</sup> The detailed recommendations are planned to be published in summer 2008.

In addition to the IIF report, several other market initiatives that are aimed at addressing weaknesses in the securitisation process are also under way, including those of the European Securitisation Forum (ESF), the Securities Industry and Financial Markets Association (SIFMA) and the European Banking Federation (EBF). The major trade associations are working on identifying market best practices and have committed themselves to cooperate with authorities and other interested stakeholders to develop timely improvements in areas where shortcomings have been detected.

1 Institute of International Finance (2008), "Interim Report of the IIF Committee on Market Best Practices", April.

#### INCOME AND EARNINGS RISKS

Against the background of the recent financial market developments, it can be expected that euro area banking sector profitability will continue to be adversely affected by the market turbulence over the next several quarters as the process of financial de-leveraging proceeds. Moreover, several developments that occurred in the first quarter of 2008, including the worsening of counterparty risk vis-à-vis US "monoline" financial guarantors and the updating of model assumptions for the valuation of various types of illiquid structured credit securities, suggest that further mark-to-market valuation losses could be disclosed by euro area LCBGs in the near term. Additional factors that are likely to dampen the future earnings growth of LCBGs include elevated funding costs, lower non-interest income from securitisation and financial market activities, as well as slowing credit growth.

Regarding the latter point, in the latest ECB bank lending surveys (BLSs) banks consistently reported declining expected net demand for loans to households for house purchases and loans to non-financial corporations. However, in the latest survey, conducted in April 2008, the fall in expected demand was slightly less than in the previous quarters. Against this background, it is worth noting that banks seem to have already taken action to boost their interest income by simultaneously increasing their lending margins (see Chart S94) and sharply reducing their deposit margins (see Chart S98).

As to the probable impact of increased market volatility on LCBGs' appetite for risk-taking, banks have started to tighten their credit standards and, at the same time, there are indications that they have reduced their exposures to some riskier activities, such as commercial real estate lending and the funding of leveraged buyout (LBO) deals or hedge funds.<sup>6</sup> Such a reaction by banks is consistent with a risk management strategy whereby financial institutions target a particular level of a certain risk metric, such as the value at risk (VaR). Indeed, if VaR is seen as a product of the size of an institutions' exposure to an asset (a security or a loan) and the price volatility of that asset, then under such a strategy an increase in risk (volatility) would lead risk managers to reduce their institution's exposure to these assets.<sup>7</sup> Given that lending for the above-mentioned purposes had been an important source of income for many euro area LCBGs over the past few years, a retrenchment from these activities could have a sizeable short-term negative impact on banks' earnings.

6 However, this information needs to be interpreted with some caution given the continuing strength of growth in banks' lending to the private sector as measured by the MFI statistics in the first quarter of 2008.

7 Recent empirical evidence suggests that banks indeed are engaged in active balance sheet management whereby they adjust their leverage upwards during economic upswings (when volatility and perceived risks are low) and downwards during downturns (when volatility and perceived risks are high). See, for instance, T. Adrian and H. Shin (2007), "Liquidity and Leverage", Federal Reserve Bank of New York, mimeo, and D. Greenlaw, J. Hatzius, A. Kashyap and H. Shin (2008), "Leveraged Losses: Lessons from the Mortgage Market Meltdown", paper presented in the US Monetary Policy Forum Conference, February.

**Chart 4.9 Earnings and earnings forecasts for large and complex banking groups in the euro area**

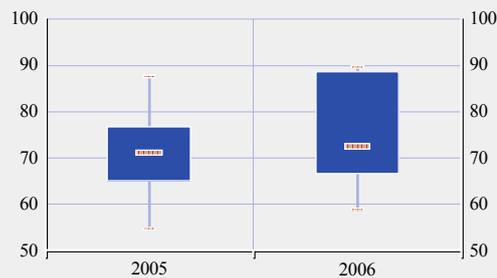
(Q1 1999 – Q4 2008; % change per annum; weighted average)



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 4.10 Distribution of euro area large and complex banking groups' retained earnings**

(2005 – 2006; % of net income; maximum, minimum, interquartile distribution and median)



Sources: Bureau van Dijk (Bankscope) and ECB calculations.

Against this background, analysts' forecasts for the short-term future earnings growth of euro area LCBGs have been revised downwards compared with the forecasts of six months ago (see Chart 4.9). While earnings growth is expected to remain subdued in the course of the year, it should be recalled that the level of profitability of these institutions still remains relatively high historically and the downturn is expected to be milder than was the case in 2002.

Finally, an important source of capital accumulation for banks is through the retention of earnings. Indeed, after dividend payments, most of the earnings of euro area LCBGs over recent years have been retained as reserves which form one part of Tier 1 capital (see Chart 4.10). Against the strength of the profitability of these institutions over the past few years, the retention of profits has allowed them to put aside funds against future shocks to their balance sheets. As most institutions still managed to generate profits in 2007, despite the turbulence, this means that the buffers they had accumulated in the past were not substantially eroded. However, the ability of euro area LCBGs to retain earnings at the same rate as in the past will most likely be impaired.

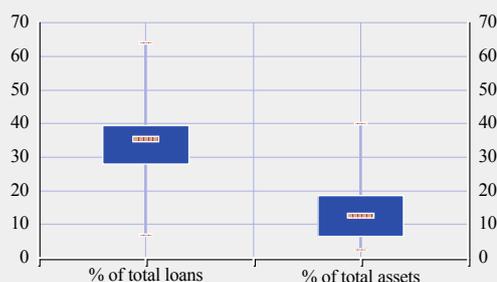
### HOUSEHOLD SECTOR CREDIT RISKS

Lending to households is an important business line for most euro area LCBGs and for some of them it represents a sizeable proportion of their overall lending portfolios (see Chart 4.11). Hence, the creditworthiness of households is important in assessing the overall risk profile of these institutions.

Regarding the risks associated with the stock of loans to euro area households on the balance sheets of banks, as discussed in detail in Section 2.4,

**Chart 4.11 Distribution of euro area large and complex banking groups' loan exposures to households**

(2006; %; maximum, minimum, interquartile distribution and median)



Sources: Individual institutions' financial reports and ECB calculations.

measures of household sector leverage and the household interest burden in the euro area increased slightly further in the six months after the finalisation of the December 2007 FSR, although at the euro area average level these measures remain moderate by international comparison. At the same time, the gradual increase in interest rates as banks pass on past increases in policy rates provide a backdrop for increased, albeit still on average rather contained, credit risks for banks on their household lending side.

Important in the assessment of the credit risk facing banks in their mortgage lending to households are conditions in the housing market, including the risks of house price decline, the prudence of lending standards applied in the past and the prevailing levels of loan-to-value (LTV) ratios. In this vein, although there are some signs that prior to late 2007 credit standards had been loosened considerably in some countries, LTV ratios were generally set at rather conservative levels. That said, previously identified pockets of vulnerability continue to exist especially in those Member States where rapid house price increases have contributed to cyclically low LTV ratios by increasing the denominator of the ratios, and where risks of house price reversals are highest due to low levels of affordability. In addition, households with high levels of consumer debt and mortgage debt contracted at variable interest rates could be more vulnerable in the period ahead should the banks they have borrowed from decide to pass on the elevated funding costs prevailing in the wholesale and capital markets.<sup>8</sup>

Regarding the credit quality of new loans extended to households, the ECB bank lending surveys conducted in January and in April 2008 indicated that euro area banks had tightened their credit standards on housing loans (see Chart S104). The main factors behind the net tightening were a worsening of expectations regarding general economic activity and a deterioration in housing market prospects. In addition, large banks in particular quoted the cost of funds and balance sheet constraints as factors contributing to tighter standards. Credit

standards for consumer credit and other lending were also tightened according to the two surveys conducted in 2008 thus far, reversing the net easing of credit standards on these loans still reported in October 2007 (see Chart S105). Worsening expectations regarding general economic activity and the creditworthiness of consumers were the most important factors reported by banks for the net tightening. Looking forward, in the April 2008 BLS, banks reported that they expect credit standards applied on all kinds of loans to households to be tightened further in the following quarter, while they also expect a further slowdown in demand for loans for house purchases.

#### CORPORATE SECTOR CREDIT RISKS

Regarding LCBGs' credit risks on their corporate loan books, the combined impact of tightening financing conditions, slowing economic growth, appreciation of the euro exchange rate and further increases in oil prices rather unambiguously point towards an increase in expected corporate sector default rates in the euro area. As discussed in Section 2.2, however, actual default rates in the euro area had only shown a moderate pick-up by early May 2008, although going forward a more pronounced increase could be expected. The very low default rates of recent years appear, in part, to have been a symptom of easier financing conditions and lax lending standards. However, they may also reflect the continuing favourable business cycle conditions in some Member States. Furthermore, many non-financial firms have undergone extensive balance-sheet restructuring throughout the current decade. For instance, there are indications that firms were able to negotiate debt contracts that allowed them to postpone bankruptcies in the event of financial distress by allowing them to roll over their debts even with seriously depleted cash flows. While such arrangements could be seen as being favourable for all parties concerned in the long run in cases where firms face temporary financial difficulties

<sup>8</sup> However, a more detailed assessment would require extensive analysis of sufficiently homogeneous micro-level data from the household sector which is relatively scarce in the euro area. For more details see ECB (2007), "EU banks' exposure to residential property markets", *EU Banking Sector Stability*, November.

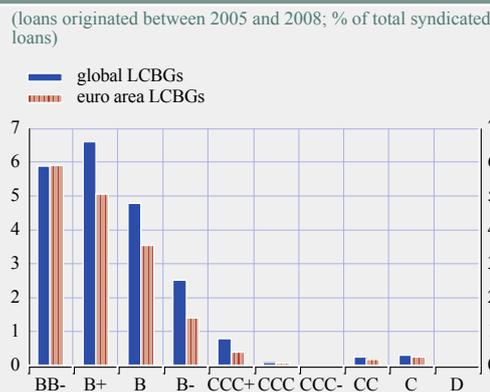
(and are reminiscent of “relationship lending” practices), in a more prolonged corporate sector downturn they may simply postpone the inevitable but, at the same time, allow losses to accumulate for longer and to much higher levels than might otherwise have been the case. Hence, to the extent that such practices became increasingly common in the latter part of the upward phase of the recent credit cycle, there is a risk that default rates and loss given defaults could be higher than expected in the downward phase of the credit cycle.

Looking at the exposures of euro area LCBGs to riskier forms of corporate lending (e.g. firms rated below investment grade or below BBB), it appears that the largest concentrations are in lending to firms rated BB- (see Chart 4.12). Lower down the credit quality spectrum, exposures decline steadily. Global LCBGs by contrast have the greatest concentrations of exposures towards slightly lower-rated loans.

It is important to note that many of these loans were originated with a view to subsequent sale to the secondary loan markets. The dislocation of these markets since August 2007 has, however, forced many LCBGs to “warehouse” leveraged loans on their balance sheets. At the time of the cut-off date for this FSR, there were signs that banks were starting to be able to sell their warehoused loan exposures, albeit at substantial discounts, which will reduce the risk of further increases in capital requirements and mark-to-market losses. Box 14 provides an assessment of the risks of future valuation losses on the banks’ warehoused leveraged loans.

Looking at the geographical distribution of exposures of euro area LCBGs to sub-investment grade lending, the greatest concentration of exposures are towards the United States (see Chart 4.13). This is due mainly to the fact that the sub-investment grade corporate credit market is much deeper in the United States than anywhere else. Looking forward, this means that a potential deterioration in the credit cycle in the US corporate sector could pose heightened credit risks for some euro area LCBGs that are particularly active in these markets.

**Chart 4.12 Euro area large and complex banking groups’ exposure to sub-investment grade corporate loans**

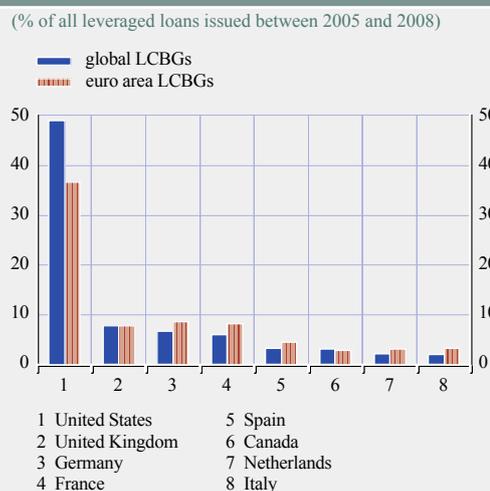


Source: Dealogic.

Finally, as discussed in detail in Section 2.3, the fact that some risks and vulnerabilities in the commercial property markets have increased could pose risks to banks in Member States where lending exposures to the commercial real estate investment and construction sectors are high.

All in all, banks’ credit risks on their corporate sector loan books appear to be rising. This has been reflected in announcements by many euro area LCBGs in early 2008 that they have increased their reserves for future expected

**Chart 4.13 Geographical concentration of loans extended by euro area LCBGs to sub-investment grade corporates between 2005 and 2008**



Source: Dealogic.

### LEVERAGED LOAN EXPOSURES AND MARK-TO-MARKET WRITE-DOWN RISKS OF EURO AREA LARGE AND COMPLEX BANKING GROUPS

Between 2004 and 2007 the issuance of leveraged loans (loans extended to below investment-grade-rated companies) almost tripled in the euro area, reaching around €240 billion. A number of mutually reinforcing factors contributed to the substantial pick-up in this type of lending by euro area banks. In particular, a boom in global leveraged buyout (LBO) activity increased the supply of these loans which were readily absorbed by investors due to the rapid expansion of a secondary market for such loans and the growing popularity of collateralised loan obligations (CLOs) which also took leveraged loans into their underlying collateral pools. The growth in the leveraged loan market also coincided with a shift by many large banks from a “buy and hold” business model towards an “originate and distribute” one. However, distribution of collateralised debt securities into the markets became very difficult from the second half of 2007 onwards as a result of the market turbulence. This meant that many banks were forced to “warehouse” leveraged loans that they had originally been planning to securitise. This left them exposed to credit and market risks on these loans. Against a background in which only a relatively small share of leveraged loan exposures had been written down by euro area LCBGs by early May 2008,<sup>1</sup> this box makes an attempt to estimate the magnitude of total mark-to-market write-downs on banks’ leveraged loan exposures.<sup>2</sup>

Estimates of the potential write-downs that could be facing euro area LCBGs in the period ahead can be made by combining information on the market value of leveraged loan tranches implied by credit default swap spreads for these loans with individual bank-level data on LCBGs’ leveraged loan exposures. The market’s view about the net present value of leveraged loans, taking into account expected default rates, is reflected in the LCDX index. This index consists of CDS spreads of 100 reference leveraged loans and it was developed in order to allow banks and other financial market participants to hedge their loan exposures. For the purpose of this box, the index was decomposed with a non-linear optimisation technique into the par values of five separate tranches using data on the CDS spreads on various LCDX index tranches. These implied par values of tranches were then matched with ratings.

According to the estimated implied tranche values, after August 2007 the market value of several lower-rated tranches decreased markedly (see Chart A). Since several euro area LCBGs have disclosed that they have significant holdings of leveraged loans on their balance sheets, the drops in the market values indicate that there could be a risk of significant future write-downs on these exposures. It is possible to estimate the bank-specific mark-to-market losses for euro area LCBGs on their holdings of leveraged loans by combining the information on changes in the LCDX index with information on the exposures of euro area LCBGs to leveraged loans, which can be obtained from the Dealogic database on a deal-by-deal basis.<sup>3</sup> The exposure of each bank to different tranches, combined with the LCDX index-implied tranche value, can provide a rough estimate of the total implied mark-to-market loss of each bank on its leveraged loan portfolio. Some caveats to

1 According to JP Morgan data, the share of write-downs across the LCBGs most heavily exposed to leveraged loans ranged between 0% and 8.7% of the total exposure. Further write-downs on leveraged loans are expected in 2008. See JP Morgan Chase & Co. (2008), “European Wholesale & Investment Banks: The Structured Credit Mark-to-Market Tracker”, April.

2 This estimate is derived using the prevailing market value of leveraged loans implied by CDS prices for leveraged loans as at 29 February 2008.

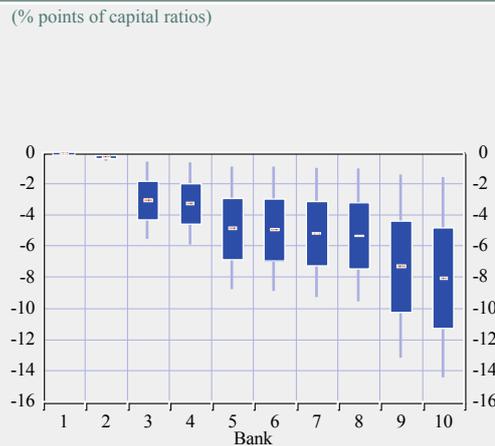
3 This analysis has been restricted to the ten LCBGs for which all necessary data were available.

**Chart A LCDX index-implied prices on different tranches of leveraged loans**



Sources: JPMorgan Chase & Co. and ECB calculations.

**Chart B Impact of implied mark-to-market losses on total capital ratio of euro area large and complex banking groups**



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

Note: Data on capital ratios refer to the 2007 year-end figures. Exposures' cut-off date is 29 February 2008, implied value of write-downs estimated as at 8 May 2008. The "length" of each individual box plot corresponds to the estimated total impact on a bank's capital ratio under different hedging assumptions: the lower end of the line represents the impact if only 10% of the portfolio is hedged, the lower end of the box 30%, the middle point 50%, the upper end of the box 70% and the upper end of the line 90%.

this approach must, however, be underlined at the outset before interpreting the results. First, the actual amount of the write-downs, if any, depends on the particular country-specific regulatory framework to which each LCBG is subject. It is probable that in those countries where mark-to-model techniques are commonly used and approved by the regulators for valuing these loans, the actual write-downs could be substantially lower than those estimated here. Second, the LCDX index-implied prices of different tranches could be affected by technical factors that have been affecting the credit markets, which could cause implied default probabilities to be higher than the actual probabilities of default.<sup>4</sup> Finally, and most importantly, banks typically hedge their leveraged loan exposures to some degree and information on this activity is not publicly available. All in all, these considerations would suggest that the approach taken here to value the losses incurred by euro area LCBGs on their leveraged loan portfolios provides an upper bound to the true losses these institutions may ultimately incur should the loan market not recover.

Chart B shows the impact of estimated losses in terms of reductions in individual LCBGs' capital ratios. Because of uncertainty about the extent of hedging by these institutions, the changes in the total capital ratios shown are estimated under different assumptions regarding the degree of hedging. In particular the "length" of each individual box plot in Chart B corresponds to the estimated total impact on a bank's capital ratio under different hedging assumptions: the lower end of the line represents the impact if only 10% of the portfolio is hedged, the lower end of the box 30%, the middle point 50%, the upper end of the box 70% and the upper end of the line 90%. The results suggest that even if a significant proportion of the leveraged loan exposures are hedged, a number of euro area

<sup>4</sup> Moreover, the LCDX-implied tranche values include not only default risk but also cancellation risk in the underlying LCDX index, i.e. the risk of reduced duration of the underlying single-name loan credit default swap (LCDS) contracts due to repayment of a loan before it matures. This may contribute to an underestimation of the implied tranche values.

LCBGs would still endure sizeable losses relative to their capital if these exposures were completely written off. If, on the other hand, exposures are largely unhedged, then some institutions could suffer much larger losses. Although some institutions have already made substantial write-downs in recent months, the remaining sizes of the exposures to leveraged loans across the euro area LCBGs pose risks of further write-downs. That said, it cannot be ruled out that some recovery in market prices could take place in the period ahead, which could offset the need for further write-downs.

credit losses. Overall, however, banks following IFRS reporting schemes are still taking relatively low impairment charges for credit losses, reflecting the fact that actual default rates have remained low. In view of such procyclicality, it is also probable that impairment charges will rise materially if corporate sector default rates suddenly pick up. Impairment charges would also rise if banks decided to fully write off their holdings of debt securities which have been negatively affected by the financial market turmoil.

Regarding the credit standards being applied by banks on new corporate loans, despite the continued strength of growth in new lending, the results of the last two ECB bank lending surveys indicate that banks in the euro area have responded to the ongoing market turmoil with a marked tightening of lending standards on new loans to non-financial corporates beyond what was already reported in October 2007 (see Charts S102 and S103). This tightening was especially marked for long-term lending to large corporations, although the small and medium-sized enterprise (SME) sector was also negatively affected. The factors that contributed most to the tightening of credit standards were worsening expectations regarding general economic activity and industry and firm-specific outlooks. Factors related to the banks' capital and liquidity positions and their ability to access market financing also contributed to the tightening. The latter factor was particularly important for larger banks, suggesting that the problems in the various segments of market-based funding could be having a more profound impact on the lending decisions of these institutions. Regarding the conditions and terms, banks

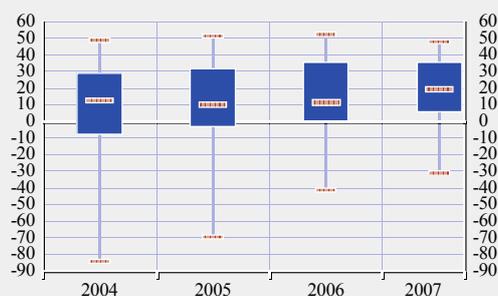
have widened their margins sharply and progressively throughout the period since the onset of the financial market turmoil, but they have also tightened their non-price terms and conditions, by demanding, for instance, more collateral and more stringent loan covenants.

#### FUNDING LIQUIDITY RISKS

For euro area banks, the financial market turmoil that erupted in August 2007 has underlined the importance of funding liquidity risk and the processes that should be put in place to manage it. In particular, many euro area LCBGs continued to show a positive customer funding gap, and the median funding gap even increased in 2007 (see Chart 4.14). Although there are wide differences within the group of LCBGs, with some large banks maintaining a deposit surplus or a relatively narrow positive gap, this reflects the fact that large euro area banks in general have become more vulnerable to adverse changes in the cost of and access to market-based funding.

**Chart 4.14 Customer funding gap of large and complex banking groups in the euro area**

(2004 – 2007; % of customer loans; maximum, minimum, interquartile distribution and median)



Source: Individual institutions' financial reports and ECB calculations.

Note: The customer funding gap is defined as the difference between customer loans and customer deposits.

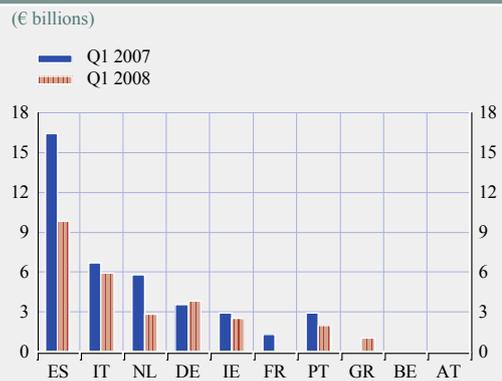
Funding liquidity risk management also has an important systemic dimension, as a vicious interplay between funding and market liquidity risk may emerge when an institution facing liquidity problems transmits them wider in the system via its inability to honour its payment commitments in the wholesale funding network. As discussed in earlier parts of this Review, since August 2007 the euro area interbank market has been plagued by widespread market liquidity problems which were initiated by funding problems in individual institutions and have since contributed to a hoarding of funds among many of the liquidity providers in the interbank network.

To better understand such shock transmission mechanisms, tools and indicators are needed to analyse the properties of the network of financial flows among financial institutions. To this end, Box 15 provides an illustration of the cross-border banking payment flows network in the EU based on publicly available data at the country level.

In the April 2008 ECB bank lending survey, the responding banks confirmed that the financial market turmoil had created more difficult conditions for accessing wholesale funding and funds in the unsecured interbank money market in the first quarter of 2008. However, banks expected the access to such funds to become slightly less hampered in the quarter ahead.

Regarding risks to other sources of funding for banks, activity in the securitisation markets was also brought to a virtual standstill early in the turmoil. This presented challenges especially for those euro area LCBGs which had adopted the originate-and-distribute business model. Chart 4.15 shows that loan sales indeed declined markedly in the first quarter of 2008 compared to the situation a year earlier. In the April 2008 ECB bank lending survey, banks confirmed that securitisation activity continued to be hampered for the selling of

Chart 4.15 Euro area banks' loan securitisation issuance per country of collateral



Source: European Securitisation Forum.

loans for house purchase and for the selling of corporate loans.

The covered bond market, which is not included in the chart above and which constitutes a substantial source of funding for banks in many euro area countries, also saw declining issuance activity in late 2007 and in the first quarter of 2008. Nevertheless, this market remained considerably more functional than the market for true-sale loan securitisation. Overall, banks have been reporting that their ability to transfer credit risk more generally has been hampered and that this has had an adverse impact on their willingness to lend. Furthermore, many banks responding to the April 2008 bank lending survey also revealed that draw-downs on committed liquidity lines to off-balance-sheet vehicles continued to have an adverse impact on their lending policies, although risks associated with off-balance sheet exposures could have gradually diminished in scale as many of the special-purpose vehicles had either sold their assets or the sponsoring banks had absorbed them onto their own balance sheets. At the time of finalising this Review, the functioning of the securitisation and credit risk transfer market was expected to remain hampered by acute risk aversion for the foreseeable future.

**ANALYSING THE TOPOLOGY OF THE EU CROSS-BORDER BANKING FLOWS NETWORK**

In an integrated financial system, cross-border banking flows are an important source of funding for financial institutions as well as for private sector borrowers. From the viewpoint of financial institutions, wider access to wholesale financing reduces the dependency of individual institutions on local deposit bases and it allows for a more efficient day-to-day management of their funding liquidity needs. In addition, by allowing for the matching of institutions with surplus and deficit funds in the cross-border interbank markets, it provides obvious welfare gains from trade. For retail clients, an integrated cross-border banking market allows for equal treatment of borrowers across different parts of the financial system by exposing local lenders to foreign competition. At the same time, however, in times of financial stress a network of cross-border banking flows could provide a channel through which problems in one institution may propagate wider throughout the financial system. This box illustrates some stylised facts about the network of EU cross-border banking flows (and its interlinkage with the United States which is included as a proxy for the “rest of the world”), using country-level data collected by the Bank for International Settlements (BIS). At the European level, an EU rather than a euro area geographical scope to the analysis is more meaningful due to the fact that some non-euro area EU countries, such as the United Kingdom and Sweden, are important financial counterparties for several euro area countries.

The data consist of consolidated claims of reporting banks on an immediate borrower basis. In order to obtain maximum data coverage at the EU level, total foreign claims on an ultimate risk basis – which includes exposures of banking groups not only to other banks but also to the non-bank private sector and the public sector – are considered. However, not all EU countries report figures under these statistics and the illustration below therefore covers the largest possible subset of countries. According to the BIS figures, the “pure” interbank exposures – for which there is only incomplete data coverage – represent on average about 35% of the total foreign claims, a share which has remained fairly stable over time. The data report bilateral flows of cross-border claims and debts across most EU countries over the period between Q2 2005 and Q2 2007.

To analyse the relative importance of the various countries in this extended EU network of cross-border banking transactions, it is useful first to consider the net flows. Chart A shows that in the cross-border banking flow network, for many of the EU Member States included in the chart the claims and debts broadly net out vis-à-vis the other countries in the system. The main exceptions to the near-zero net position in the system are Germany, France and the Netherlands, which have net claims positions, mostly vis-à-vis the United Kingdom. Outside the EU system, the United States has a large net debt position against many EU Member States, especially the United Kingdom, Germany and the Netherlands. Closer analysis of the net banking flows data, including smaller Member States, reveals in addition that there are rather strong regional links in the cross-country net banking flows. For example, banks in Finland, France, Portugal, Austria and Italy all have their neighbouring countries among their main counterparties.

In order to illustrate the relative importance of the various countries as financial centres in the network of cross-border banking flows, Chart B presents the same data in a different way by summing up the cross-border banking debts and claims to gross flows. For example, looking at

**Chart A Net cross-border banking flows across selected EU countries and the United States**

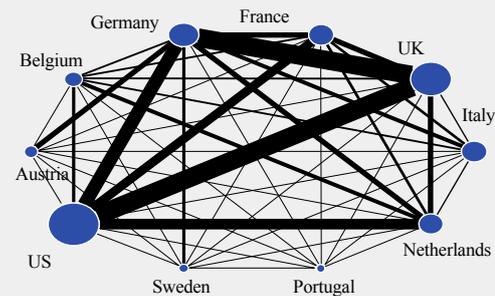
(€ billions; claims minus debts)



Sources: Bank for International Settlements and ECB calculations.

**Chart B Gross cross-border banking flows across selected EU countries and the United States**

(claims plus debts)



Sources: Bank for International Settlements and ECB calculations.

Note: The size of the circles and the thickness of the lines are proportional to the volume of the claims and debts for each country.

the total net flows in the system, the United Kingdom has only a rather small net debt position, but in terms of gross flows it is a very large player, reflecting its position as a centre for financial transactions in the EU. Germany and, to a lesser extent, France and the Netherlands are also important hubs in the EU banking system in that they process a large gross amount of flows. The chart also shows the importance of the United States as a global financial counterparty to many EU countries in gross terms.

Although this is useful for improving the understanding of some of the key characteristics of the topology of the EU financial system, for financial stability monitoring purposes bank-level information on gross interbank flows would provide a more relevant source of information. As an illustration of the usefulness of such data, the Federal Reserve Bank of New York has analysed the topology of the interbank payment flows within the US Fedwire real-time settlement system.<sup>1</sup> Within the system, some 5,000 participating banks are involved in around 700,000 transfers on an average day. Nevertheless, the analysis revealed that the network is characterised by a relatively small number of “strong” flows so that, on a daily basis, 75% of the payment flows involved less than 0.1% of the institutions in the system. The average bank in Fedwire was found to be connected to 15 other banks. Again, a closer analysis revealed that the dispersion of these connections is very wide as most banks have only a few connections while a small number of “hub banks” can have thousands of connections. In terms of preventing systemic crises, whereby disturbances can quickly spread within the network of institutions, identifying such systemically relevant hub institutions and closely monitoring their liquidity and solvency situation would be particularly relevant.

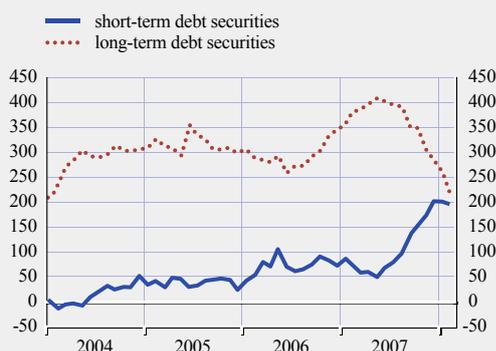
<sup>1</sup> See K. Soramaki, M. Bech, J. Arnold, R. Glass and W. Beyeler (2006), “The Topology of Interbank Payment Flows”, *Federal Reserve Bank of New York Staff Report*, No 243.

As heightened money market volatility gradually spread to other market segments as well, funding from capital market sources also became more expensive for banks as the cost of both equity and debt financing surged. The sharp increase in spreads of bonds issued by

banks in particular suggests that debt issuance could have become very expensive for many lower-rated banks. Overall, these developments in capital markets have accentuated the pressures towards tighter financing conditions for banks.

**Chart 4.16 Net issuance of debt securities by euro area MFIs by maturity**

(Jan. 2004 – Feb. 2008; € billions; 12-month moving sum)



Source: ECB.

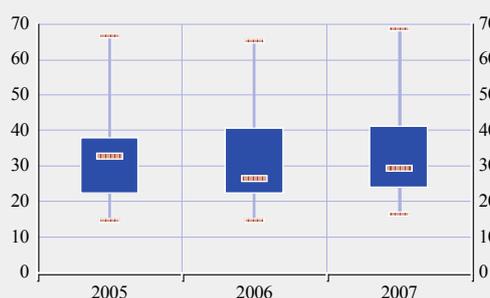
The observed decline in banks' issuance of medium and long-term debt as well as the significant decline in securitisation activities may also result in a decrease in the average maturity of banks' liabilities, thereby possibly increasing rollover risk. In particular, recent debt securities issuance activity by euro area MFIs indicates a slowdown in long-term debt issuance coupled with a rapid rise in short-term debt issuance, consistent with what banks reported in the April 2008 ECB bank lending survey (see Chart 4.16).

Moreover, available evidence suggests that the average maturity of euro area LCBGs' liabilities shortened in 2007, reversing the favourable developments in 2006. Whereas these institutions managed to lengthen the average maturity of their liabilities in 2006, indicated by a decline in the median share of euro area LCBGs' short-term non-deposit liabilities from 32.9% in 2005 to 26.5% in 2006, the share of non-deposit liabilities maturing within three months increased in 2007 (see Chart 4.17).<sup>9</sup>

Against this background, some euro area banks, in particular those relying more on wholesale funding sources, may need to expand their retail deposit base in order to maintain or increase the share of stable funding sources in

**Chart 4.17 Share of short-term non-deposit liabilities for large and complex banking groups in the euro area**

(2005 – 2007; % of total liabilities; maximum, minimum, interquartile distribution and median)



Sources: Individual institutions' financial reports and ECB calculations.

total liabilities.<sup>10</sup> Country-level information suggests that in the first few months of 2008, euro area banks indeed stepped up their efforts to increase their retail deposit base. Available evidence suggests that the funding gap of euro area banks, based on aggregate balance sheets of euro area MFIs, decreased from the high of €1,540 billion in September 2007 to €1,430 billion in March 2008.

Whereas a possible shift in banks' funding structure towards deposits may be welcome with regard to reducing funding liquidity risks going forward, increasing competition in the deposit market is likely to further contribute to an increase in banks' funding costs. In fact, the deposit margins of euro area MFIs significantly narrowed in early 2008 (see Chart S98).

## MARKET-RELATED RISKS

### Interest rate risks

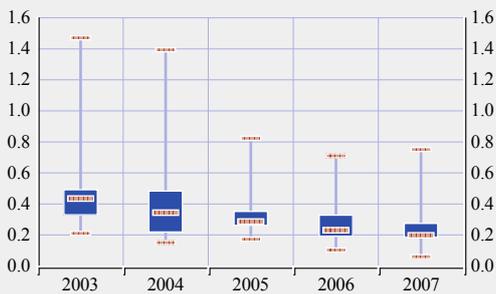
After the finalisation of the December 2007 FSR, LCBGs' interest rate risks increased significantly for a number of reasons. First, risks of future losses in the banking book could

<sup>9</sup> Note that the maturity breakdown of balance sheet items for 2007 was not available for the full sample of euro area LCBGs.

<sup>10</sup> Broadly speaking, stable funding sources include deposit funding and wholesale funding with a remaining maturity of more than one year.

**Chart 4.18 Distribution of interest rate value at risk (VaR) for large and complex banking groups in the euro area**

(2003 – 2007; % of Tier 1 capital; maximum, minimum, interquartile distribution and median)

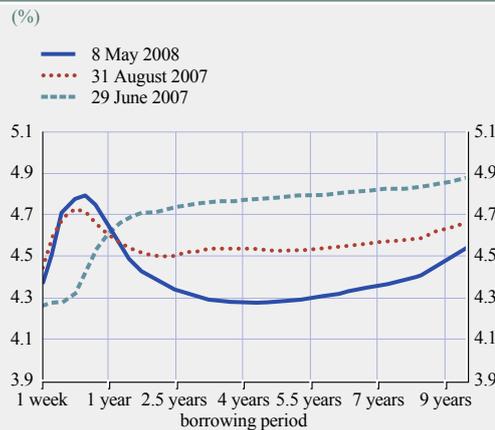


Sources: Individual institutions' financial reports and ECB calculations.

have grown due to reduced interest rate income that was caused by a flattening of the slope of the euro area yield curve. Second, there could be further losses in the trading books related to increased risks of further valuation losses for fixed income securities. Chart 4.18 depicts the individual LCBGs' reported information on interest rate value at risk (VaR) for a sample of selected LCBGs between 2003 and 2007. Overall, median interest rate VaR has declined steadily throughout this time period. Despite the further decline in the median VaR that was reported in 2007 – mainly due to the very favourable trading conditions that prevailed throughout the first half of the year – the dispersion across institutions widened and some institutions saw their measures increase quite substantially.

Looking more closely at the developments in the euro area yield curve, Chart 4.19 shows the term structure of euro area interest rates for three different points in time. At the end of June 2007 the term structure continued to exhibit a pattern that had been present since the beginning of 2007. After August 2007, it became inverted in the medium-term maturities, a shape which has become even more pronounced in recent months. At the short end of the curve, where banks tend to borrow more than they lend, the

**Chart 4.19 Term-structure curves of euro area interest rates**



Source: ECB.

cost of funding has increased since August 2007. However, at the middle and longer maturities, where banks tend to lend more than they borrow, revenues from longer-term variable-rate loans and interest-bearing money market instruments decreased compared to the period before August 2007. It cannot be ruled out that tensions in the fixed income markets could persist in the near future, so interest rate risk could remain a source of further losses in the banking and trading books of euro area banks.

An additional factor that could have contributed to a further increase in interest rate risk since August 2007 is a much lower possibility of substituting fixed income instruments along the term-structure curve. This can be explained mainly by a liquidity dry-up in the ABS and MBS markets after August 2007, combined with increased default and delinquency risk on underlying loans and bonds. As a consequence, banks have faced difficulties in substituting longer-term fixed income securities for shorter-term securities along the term-structure curve.

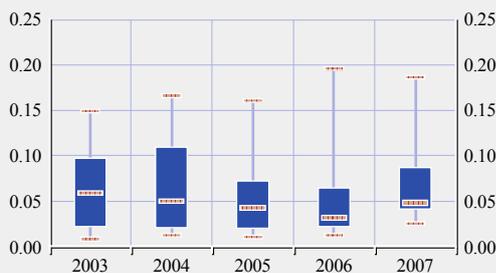
#### Exchange rate and equity market risks

The direct exposure of euro area banks to exchange rate risk is small in general, as net open foreign exchange positions are kept at low levels thanks to hedging via off-balance-



**Chart 4.20 Exchange rate value at risk (VaR) for large and complex banking groups in the euro area**

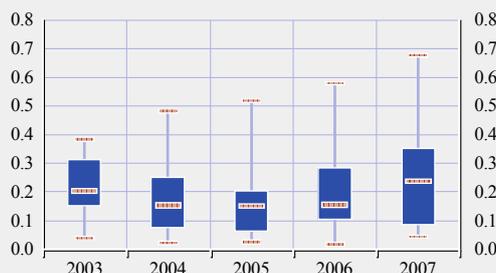
(2003 – 2007; % of Tier 1 capital; maximum, minimum, interquartile distribution and median)



Sources: Individual institutions' financial reports and ECB calculations.

**Chart 4.21 Equity market value at risk (VaR) for large and complex banking groups in the euro area**

(2003 – 2007; % of Tier 1 capital; maximum, minimum, interquartile distribution and median)



Sources: Individual institutions' financial reports and ECB calculations.

sheet derivative instruments. Looking at on-balance-sheet exposures vis-à-vis the US dollar, against the background of a depreciation of the US dollar against the euro in the second half of 2007, euro area banks lowered the share of their US dollar-denominated loans as a percentage of foreign currency-denominated loans and further increased their issuance of US dollar-denominated debt securities as a share of total foreign currency-denominated debt securities (see Chart S99).

Available information on foreign exchange VaRs for a sub-sample of LCBGs suggests that the direct exposure of large euro area banks to this type of risk may have increased slightly in the second half of 2007. Nevertheless, direct foreign exchange exposures remained small as a share of Tier 1 capital (see Chart 4.20). VaR figures may have been affected by increased foreign exchange volatility since the beginning of the turmoil. In comparison with other components of market risk, the level of foreign exchange exposures, as measured by VaR, is lower than exposures to both interest rate and equity market risk. Overall, the direct exposure of euro area banks to adverse foreign exchange movements appears to be low.

Some indirect risks, however, could remain for euro area banks. First, a further weakening of the dollar could negatively influence the

profitability of some euro area companies with significant activities in the United States. Second, unhedged foreign currency borrowing by households has grown rapidly in recent years in some countries where some of the LCBGs operate. Due to increased global risk aversion, the risk of adverse exchange rate movements may have increased in some of these countries.

Turning to banks' equity market exposures, the median equity VaR of euro area LCBGs remained broadly unchanged as a percentage of Tier 1 capital between 2004 and 2006, but then it rose in 2007 (see Chart 4.21). The rise in equity VaRs could be, in part, attributed to increased market volatility in the second half of 2007.

Concerning banks' exposures to equity market risks in broader terms, it should be taken into account that for some LCBGs, with sizeable investment banking operations, the fee income related to equity sales activities may be significant. Should the unfavourable conditions in mature and emerging equity markets persist, the contribution of non-interest income generated by sales activities could decrease compared to that realised in the pre-turmoil period. Against this background, there may be growing uncertainty, for some LCBGs at least, whether the strong contribution of

equity market-related net revenues to earnings observed until mid-2007 can be sustained in the period ahead.

### Counterparty risks

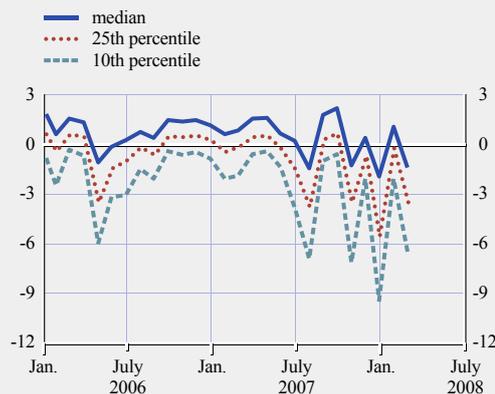
After the finalisation of the December 2007 FSR, the situation in the hedge fund sector deteriorated significantly (see Chart 4.22 and Section 1.3), particularly across leveraged credit-oriented hedge funds, some of which resorted to the suspension of investor withdrawals or ended up in liquidation. Consequently, risks for euro area LCBGs stemming from their counterparty credit exposures to hedge funds have also increased.

Despite the initial tightening of lending terms during the summer of 2007 and adjustments thereafter, newly set initial margin levels (or valuation haircuts in the case of security-based lending) again proved to be insufficient under stressed market conditions. The increased illiquidity and volatility of prices of even high-grade tradable debt obligations prompted banks to review and to increase the amount of margin that counterparties need to post at the outset or rollover of leveraged investments (see Chart 4.23). Moreover, mark-downs of various debt assets and OTC positions have led to margin calls on outstanding transactions which further aggravated the financial standing of highly leveraged credit-oriented hedge fund clients or even led to eventual defaults. At least initially, due to competition considerations, banks were reportedly less willing to apply higher initial margins to large hedge funds or were simply unable to do so because of margin lock-ups (fixed margining terms for a specified time period) granted in more benign times. However, banks later called for higher margins and thereby forced the process of deleveraging of highly leveraged hedge funds.

Another indication of higher hedge fund counterparty credit risk faced by banks is the marked increase in the estimated total net asset value (NAV) and the proportion of single-manager hedge funds breaching typical triggers of total NAV cumulative decline<sup>11</sup> after the

**Chart 4.22 Distribution of global hedge fund returns**

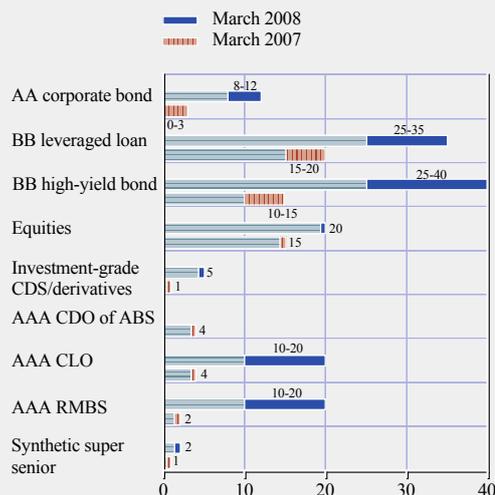
(Jan. 2006 – Mar. 2008; % monthly return in fund's reporting currency; net of all fees)



Sources: Lipper TASS database and ECB calculations.  
Note: 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. The most recent data are subject to incomplete reporting.

**Chart 4.23 Typical valuation haircuts or initial margins**

(Mar. 2007 and Mar. 2008; %; approximate estimated levels and ranges)



Source: Citigroup.  
Note: Highlighted ends of bars indicate estimated levels, except where ranges are reported. Haircuts (value reductions) are applied to bought pledged securities and serve as a downpayment in security-based lending. They are equivalent to 100% minus the loan-to-value ratio expressed in percentage terms. Initial margins are used as collateral (in the form of cash or securities) at the inception of various OTC transactions.

<sup>11</sup> Triggers of total NAV cumulative decline represent contractual termination events which allow banks to terminate transactions with a hedge fund and seize the collateral held.

finalisation of the December 2007 FSR (see Chart 4.24). Moreover, it should be noted that the data showing the total NAV of hedge funds breaching indicated triggers are reported after substantial declines in hedge funds' capital under management had already taken place.

Data on banks' losses on collateralised margin (repurchase) loans to hedge funds are unavailable, although such losses, if any, may not be large. Nevertheless, it cannot be ruled out that due to strained conditions in credit markets some banks may have had to take seized securities onto their balance sheets or sell them at distressed prices that did not cover the credit exposure left after the deduction of initial and variation margins posted by failing hedge fund counterparties. Hence, once again banks were reminded that over-reliance on collateral can prove dangerous if initial margins are not adequately stress-tested to take into account potential future counterparty credit exposure that could arise due to the perilous interaction of

leveraged market, counterparty credit, funding liquidity and collateral illiquidity risks.

Difficulties faced by Bear Stearns before the announcement of its takeover by another bank may have led to some redistribution of market shares in the rather concentrated global prime brokerage market and could have encouraged some competitors, including euro area LCBGs, to attempt to woo Bear Stearns' hedge fund clients by offering more favourable credit terms despite difficult market conditions. The Bear Stearns episode has also underscored the risks that could arise for prime brokers if hedge funds and other large counterparties were to pull out their cash and securities balances *en masse* and refuse to trade or roll over maturing transactions.

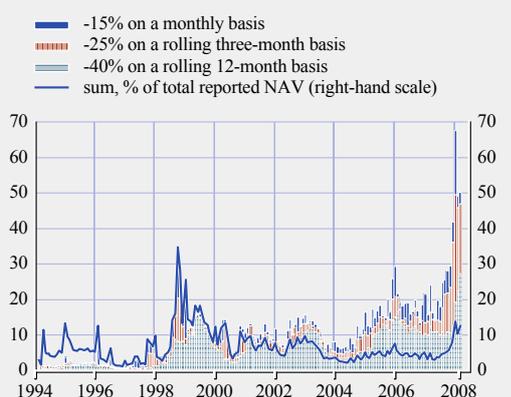
#### Emerging market exposures

Macroeconomic conditions in emerging market economies (EMEs) remained relatively stable after the publication of the December 2007 FSR. Nevertheless, emerging financial markets have been increasingly affected by the global financial market turmoil since November 2007, as indicated by widening sovereign bond spreads and decreasing equity market valuations (see Section 1.2). While the fundamental outlook for 2008 still remains favourable in most emerging economies, the downside risks to growth appear to have increased after the finalisation of the December 2007 FSR (see Section 1.1).

Against the background of robust growth in emerging economies in 2007, foreign claims of euro area banks on main emerging market regions continued to grow unabatedly. With regard to exposures to individual geographical areas, cross-border claims of euro area banks vis-à-vis Latin America continued to rise throughout 2007 (see Chart S100 and Table S6). This was driven by steadily growing exposures to Brazil and Mexico, although the rate of growth slowed somewhat in the third quarter of 2007. Looking at the breakdown of foreign claims by creditor country, exposures to this

**Chart 4.24 Estimated total net asset value (NAV) and proportion of hedge funds breaching triggers of total NAV cumulative decline**

(Jan. 1994 – Mar. 2008; USD billions and % of total reported NAV)



Sources: Lipper TASS database and ECB calculations.  
 Note: Excluding funds of hedge funds. Net asset value is the total value of a fund's investments less liabilities; also referred to as capital under management. If several typical total NAV decline triggers were breached, then the fund in question has only been 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.

region are highly concentrated within the euro area, with one country (Spain) accounting for more than 60% of the total. Therefore, steadily growing exposures of euro area banks to Latin America partly reflect the rapid credit expansion and the strong franchises of some euro area LCBGs in the largest economies of this region (Brazil and Mexico).

While the level of exposures to Asian emerging economies, measured by foreign claims, remained smaller than those to Latin America, the growth in exposures of euro area banks to Asian emerging market economies accelerated in 2007 (see Chart S101 and Table S6). The growth of foreign claims continued to be heavily concentrated amongst the three largest countries in the region, i.e. South Korea, China and India. Regarding the breakdown of foreign claims by creditor country, exposures of euro area banks are relatively concentrated, with three countries (France, Germany and the Netherlands) accounting for nearly 90% of the total.

As regards emerging Europe, foreign claims of euro area banks vis-à-vis this region also grew at a rapid pace in 2007, with total exposures catching up with levels recorded in emerging Asia.<sup>12</sup> As regards borrower countries, more than 80% of foreign claims of euro area banks in this region are concentrated in three countries (Russia, Croatia and Turkey).

As already discussed in the June 2006 issue of the FSR, some euro area LCBGs extract a non-negligible share of group profits from their foreign operations in EMEs. For these LCBGs, geographical diversification generally

proved to be supportive of overall profitability in 2007. While the asset quality of euro area banks' subsidiaries in EMEs generally remained sound in 2007, uncertainties surrounding the outlook for 2008 may have increased recently. In particular, asset quality could deteriorate somewhat if economic growth in EMEs slows down more than currently expected or if tight credit conditions persist further, with a possible negative impact on some emerging economies with higher external financing needs.

Overall, euro area banks' exposures to emerging markets had a beneficial impact on banks' profitability in 2007 and geographical diversification may have helped some LCBGs to absorb the impact of the turmoil thus far. Looking ahead, the fundamental outlook for emerging economies remains relatively favourable, although the uncertainties surrounding the growth outlook may have increased somewhat after the finalisation of the December 2007 FSR. Against this background, euro area banks' exposures to emerging markets are still more likely to have a beneficial impact on banks' profitability in the period ahead, although this positive impact could decrease were the downside risks to growth in emerging economies to materialise.

<sup>12</sup> Note that countries which joined the EU in 2004 and 2007 are not included in this category.

**STRESS TESTING: A FUNDAMENTAL TOOL FOR FINANCIAL RISK MEASUREMENT**

Stress testing is a risk management tool used to gauge the potential impact on a portfolio of hypothetical events and/or movements in a set of financial variables. There has been a tendency in the past to see stress testing as a secondary risk management tool compared to other methods of risk measurement such as value at risk (VaR). However, stress testing has become very common and sophisticated and it is being applied regularly by financial institutions to measure the likely impact of market shocks, as well as credit and liquidity events. This box explains what stress testing is, its benefits and drawbacks, and its relationship with other more established risk measures.

There are a wide variety of stress-testing categories based on the type of risks involved (market, liquidity, credit risks or any combination of these), the risk factors analysed (e.g. yield curve risks, foreign exchange risk, default risks, etc.), the stress-testing methodology (e.g. scenario analysis, what-if and risk factor analysis), the portfolio type (e.g. trading book, banking book or off-balance sheet), the geographical dimension (e.g. Europe, Japan, the United States), the level of the test (desk level, unit level, enterprise level) or the complexity of the portfolio (e.g. plain vanilla instruments, exotic structures). This variety shows that, although the principles of stress testing are simple, its application can be very complex.

Stress testing is well suited to assessing the degree of vulnerability of a portfolio in situations of crisis where normal market correlations break down and more mainstream measures of risk such as VaR fail to provide a fair picture of potential losses. In crises, markets can suddenly become very illiquid, rendering risk management strategies based on hedging useless and leading to much bigger losses than anticipated. Large and extreme swings of risk factors underlying the valuation of non-linear positions can also produce losses much larger than suggested by VaR estimates based on normal market conditions. Stress testing is also good at revealing and quantifying concentration risks through the analysis of correlation assumptions that may break down in situations of stress and could leave the portfolio with much larger exposures than first realised. Finally, stress tests, if applied well, are good at providing risk managers with information not only on the vulnerabilities but also on the possible flaws or weaknesses in the risk management framework.

Stress testing has also its limitations; in particular it is dependent on the scenarios and the subjectivity that surrounds the process of selecting the scenarios. This ultimately depends on the judgement and experience of the people applying it. The consistent application of stress testing is also difficult as it is necessary to follow through the scenarios and all possible ramifications which can be very complex. This complexity can lead to computational problems which also put some practical limitations on the frequency of stress-testing exercises.

Stress tests do not provide information on the likelihood of the outcome of the stress test happening. If the type of event considered could occur with a significant probability and the outcome yields a bad state, then the result of the stress test should be taken seriously. The lack of probability information makes stress testing a natural complement to probability-based risk measures such as VaR or expected shortfall (ES). VaR gives the maximum likely loss at a certain probability, but it does not provide any information on the loss that can be experienced if the loss exceeds VaR. Expected shortfall is a better measure because it provides the expected average value of tail losses. However, it does not really say much about possible large losses that can be

incurred beyond that level. Stress testing is good at providing information on bad states at the tails of the loss distributions, which is precisely where VaR and ES fail. VaR and ES are good at providing probabilistic measures of losses, but not so good at providing answers to “what if” questions, whereas stress tests are good at “what if” questions, but very poor at providing the associated probability of stress-testing outcomes.

The attention given to stress testing by financial institutions and regulators has increased dramatically in the last decade. This reflects a recognition that good stress testing could have helped institutions to weather various recent financial storms. Stress testing is in its own right a respectable risk measurement tool, on an equal footing with other more established risk measures such as VaR, and has a sound intellectual basis in the theory of comprehensive risk measures.<sup>1</sup> Risk managers are well-advised to keep deepening the scope and reach of stress-testing exercises so as to reduce the impact of future episodes of financial turmoil.

1 See Box 13 in ECB (2007), *Financial Stability Review*, June.

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

According to forward-looking market indicators, the outlook for euro LCBGs deteriorated further after the finalisation of the December 2007 FSR. This was primarily a consequence of continued declines in the prices of sub-prime-related assets and the propagation of strains to other segments of the credit markets. In particular, uncertainty about the potential for the market turmoil to persist in the near term, together with perceptions among market participants of risks of further substantial write-downs and mark-to-market losses by financial institutions, drove LCBG equity prices lower. Moreover, the declines in LCBG share prices were accompanied by a surge in implied volatility, which reached the highest levels seen since the first half of 2003 (see Chart S111).

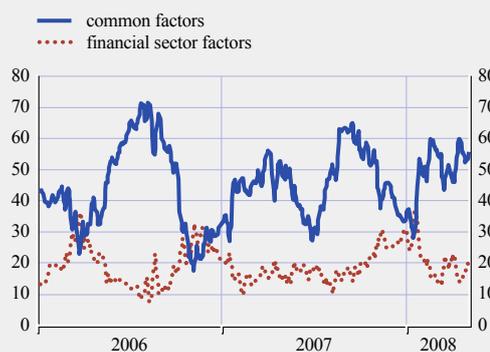
A decomposition of the volatility of bank stock prices indicates that risks specific to the financial sector, and in particular to the banking sector, were crucial in driving the changes of bank stock prices over the past six months (see Chart 4.25). Nevertheless, the proportion of the variance in bank stock prices that could be explained by a factor common to a broader set of shares traded in the euro area increased in February as concerns began to grow about the potential impact of strains in the financial sector on the real economy and the possible feedback

effects on banks’ balance sheets via higher credit risks.

Distances-to-default, an equity market-based yardstick of credit risk, for euro area LCBGs were by late March 2008 somewhat lower than their peaks of early 2007, but they still remained at very high levels (see Chart S107). This translated into a slight pick-up in expected default frequencies among these institutions (see Chart S106). All in all, these equity market-based indicators suggested that, despite the market turbulence, market participants continued to assess the shock-absorption capacity of these institutions as being relatively comfortable.

**Chart 4.25 Variance of euro area banks’ equity returns explained by common and financial sector factors**

(Jan. 2006 – May 2008, % of equity returns variance)



Sources: Bloomberg and ECB calculations.

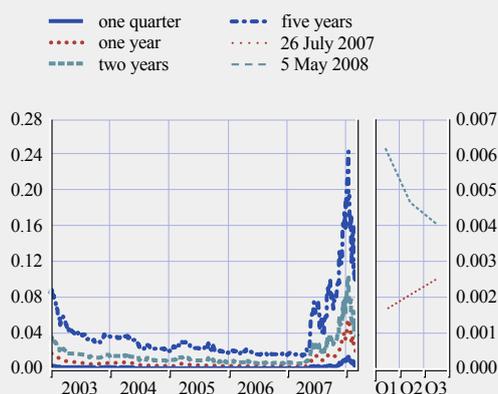
However, both distance-to-default and expected default frequency are model-based indicators calculated using stock prices as an input. Because LCBG equity prices (which reflect the present discounted value of future earnings) reacted to the recent market turmoil less strongly than CDS spreads (which reflect the assessment of default risk) equity-based indicators may have provided an over-optimistic outlook, possibly underestimating default correlations among LCBGs in the case of an adverse systemic event.

Thus, growing concerns about the credit risks posed by LCBGs were more marked among credit market indicators. This was evident, for instance, in a further substantial widening of bank CDS spreads after late November 2007 (see Chart S108). These spreads reached new historical highs in the first quarter of 2008, almost double the previous peak levels seen in 2002. While much of the change in bank CDS spreads seems to have been due to growing unease among market participants about the potential for further write-downs, as well as concerns about the future evolution of the broader credit cycle, several technical factors may explain the more marked deterioration in the credit risk assessment implied by these indicators than that provided by the equity market-based ones. For instance, a notable deterioration in credit derivative market liquidity is highly likely to have increased the sensitivity of bank CDS spreads to bad news. In addition, the widening of these spreads may have also been amplified by the rapid unwinding of synthetic CDOs that took place in the structured credit markets in early 2008.

This widening of CDS spreads in the first few months of 2008, together with a rise in the correlations between banks' equity returns, also pushed a market-based indicator of a systemic event – more specifically, the probability of two or more LCBGs defaulting simultaneously – to all-time high levels, which were reached just on the eve of the Bear Stearns rescue in mid-March 2008.<sup>13</sup> Moreover, since July 2007 hazard rates (the probabilities of a systemic event happening during a particular quarter)

**Chart 4.26 Implied probabilities of two or more euro area large and complex banking group defaults**

(left-hand panel – cumulative probability over specified period; right-hand panel – short-term hazard rates)



Sources: Bloomberg and ECB calculations.  
Note: The right-hand panel depicts instantaneous probabilities (hazard rates) of a systemic event occurring in each of the coming three quarters. For May 2008 a snapshot of the hazard rate term structure in the chart indicates a higher probability of a systemic event in the next quarter (next three months from the date indicated in the chart) than in the next but one quarter (fourth to sixth month ahead) or the third quarter (seventh to ninth month ahead).

have increased much more for near-term quarters. This reversed the slope of the “joint default probability curve”, indicating market perceptions that simultaneous default in the near term had become more likely than at longer horizons (see Chart 4.26). This appears to suggest that market participants expected that the operating environment for LCBGs could become more challenging in the very short term, most probably in the light of the erosion of some banks' earnings, but that conditions would eventually stabilise. That said, apart from the fact that the CDS spreads may have overshot their intrinsic values for the reasons described above, there are a number of caveats which should be taken into account when interpreting movements in this indicator.<sup>14</sup>

<sup>13</sup> See Box 16 in ECB (2007), *Financial Stability Review*, December, for a description of how this indicator is constructed.

<sup>14</sup> For instance, the indicator is rather strongly dependant on the strength of the signal-to-noise ratio of the price discovery process in the CDS markets. If, for example, the CDSs of LCBGs have been affected by other than fundamental factors, the true implied probabilities of default should be commensurately lower. Notwithstanding these caveats, recent patterns in this indicator appear to imply a rise in the perceptions of systemic risk for euro area institutions among market participants.

**Chart 4.27 Option-implied risk-neutral density bands for the Dow Jones EURO STOXX bank index**

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



Sources: Bloomberg and ECB calculations.

Perceptions of heightened downside risk in the short term have also been present in the size and shape of risk-neutral density (RND) functions for euro area bank stock prices as implied in the pricing of options. In particular, this distribution of perceived possible outcomes for the Dow Jones EURO STOXX bank index became wider, reflecting greater uncertainty, and more negatively skewed after early November 2007 as market participants were prepared to pay higher premiums in order to avoid downside risk (see Chart 4.27). Notable in the latter respect is that although the early November 2007 estimates of the probability distribution were already relatively wide and tilted towards lower values, the actual index value ended up below even the 90% confidence interval of the implied distribution. This shows that the severity of the drop in bank equity prices surprised market participants just as it had done over the previous six months. To some extent, this larger than expected decline in stock prices was driven by announcements by many LCBGs of substantial write-downs, the scale of which had not been broadly anticipated in early November 2007.

After early November 2007 changes in the size and shape of the implied probability distribution suggested that, although uncertainty remained high, perceptions of the likelihood of LCBG share prices recovering had increased somewhat. Nevertheless, the distribution remained negatively

skewed in May 2008, which means that downside risks were still seen as outweighing the upside risks as assessed by the market.

Turning to the longer-term horizon, price-earnings (P/E) ratios for euro area LCBGs based on ten-year trailing earnings fell substantially in the second half of 2007 and in the first months of 2008, reaching their lowest values since 2003 (see Chart S113). This would appear to suggest either that the substantial repricing of bank equities reflected expectations that the profit-generating capacity of these institutions was permanently lowered by, for instance, the impairment of the “originate-and-distribute business model” over the longer term or that stock prices were driven below their intrinsic values by heightened uncertainty. The downward revisions of short-term profit expectations after mid-2007 discussed above provide some support for the former hypothesis, although the second cannot be entirely ruled out.

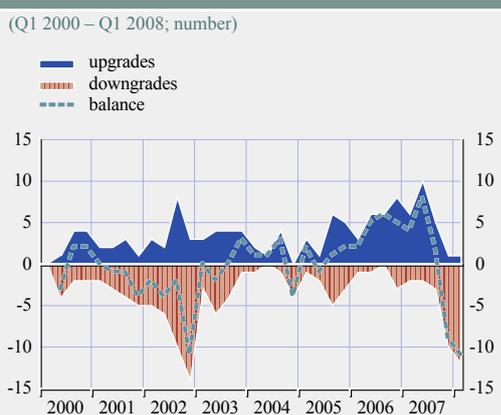
All in all, recent patterns in market-based indicators suggest that the risk outlook for euro area LCBGs deteriorated further over the six months after early November 2007. In particular, market participants had become more uncertain about the future performance of these financial firms. The substantial widening of credit spreads, together with the simultaneous decline in equity prices, suggested that market participants had revised downwards their expectations of banks’ future earnings to such a degree that they also saw a risk that banks’ capital buffers could be eroded going forward.

#### DOWNWARD RISK FOR RATINGS CONTINUES

The overall high level of ratings that was reported for euro area LCBGs in the December 2007 FSR was maintained in the first few months of 2008, and the average rating remained in the AA- category (see Table S7). Moreover, on an asset-under-management weighted basis, by the first quarter of 2008 around 75% of the assets of euro area LCBGs were under the control of institutions with ratings of AA- or higher.

However, rating outlooks, which are considered to be a medium-term indicator of the potential

**Chart 4.28 Rating actions for large and complex banking groups in the euro area**



Sources: Moody's, Fitch Ratings and Standard and Poor's.  
 Note: This includes both outlook and actual rating changes.

direction of a long-term credit rating (beyond one to two years), deteriorated markedly (see Table S7). Across the sample, in the six months after the finalisation of the December 2007 FSR, the three major rating agencies assigned eleven negative outlooks, as against two positive outlooks. Overall, the balance of positive to negative quarterly rating actions, which includes both changes in rating outlooks and changes in rating levels, decreased significantly in the period after the finalisation of the December 2007 FSR (see Chart 4.28).

Notwithstanding the fact that the global financial turmoil clearly marked a turning point in rating trends, with a gradual erosion of the largely positive rating bias seen in recent years, the overall high level of ratings for euro area LCBGs reflected a consensus among the rating agencies that most of these institutions have sufficiently large financial buffers to weather a prolonged deterioration in the operating environment. Although individual negative rating actions cannot be ruled out if pronounced market volatility persists, rating agencies do not expect wide-scale or multi-notch downgrades of major euro area banks.

Against the background of the exceptional volatility in bank earnings that was generated by

the write-downs in the second half of 2007, by early May 2008 rating agencies were expecting euro area LCBGs to experience a softening in profitability going forward in 2008. Some uncertainty remained about the speed and extent of recovery in activity in some investment banking business lines. For instance, certain segments of the capital markets, especially structured credit markets, were expected to remain depressed for an extended period. In addition, it was expected that the profitability of most banking activities would continue to be dampened by higher funding costs and that underlying performance may come under pressure if the debt market dislocation were to deepen.

In more traditional commercial banking activities, rating agencies anticipated growing margin pressures if banks proved unable to pass on the higher costs of wholesale funding. Most banks have been putting increased emphasis on capturing retail customer deposits, which could also put pressure on margins in a context of stable or declining short-term market rates. Finally, given the likely slowdown in credit growth in the period ahead, in particular in property markets, rating agencies believed that banks are likely to concentrate more efforts on cost control in order to compensate for slower revenue growth. However, rating agencies also saw a likelihood that retail banks will fare better than those which have greater reliance on capital market activities.

Rating agencies expect the credit risk facing euro area LCBGs to rise as the recent market turmoil and tighter credit conditions start to affect economic activity. This deterioration in credit quality is nevertheless expected to be moderate given the rather strong asset quality of euro area banks. In addition to issues discussed in Section 4.2, other factors that are seen by rating agencies as straining bank capital positions going forward are the prospects of lower capital requirements under Basel II, lower internal capital generation, reduced access to the securitisation and syndication markets, and

possible further unrecognised exposures to off-balance-sheet vehicles.

All in all, by early May 2008, rating agencies assessed most euro area LCBGs as being in considerably better shape than was the case prior to the cyclical downturns experienced in the 1990s, given higher overall levels of capital and vastly improved risk management capabilities. This calls for an affirmation of the high rating levels which, however, remain vulnerable to downgrades if expectations about future earnings resilience are not met.

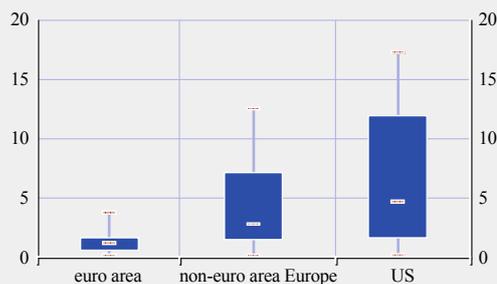
#### 4.4 OVERALL ASSESSMENT

The publication of euro area LCBGs' financial results for 2007 has shown that most of these institutions endured significant declines in net income during the last two quarters of the year, which also weighed down their performances on a full-year basis. The extent of the declines has been mixed across institutions, due mainly to differences in valuation changes on different amounts and types of exposures. This can be seen in Chart 4.29, which shows the distribution of euro area LCBGs' turbulence-related losses in 2007 after-tax net income as disclosed by banks in their financial reporting. The chart also illustrates that the disclosed losses by euro area LCBGs have been far smaller than the losses reported by their non-euro area European and US peers. Owing to the continuing deterioration in market conditions in the first quarter of 2008, it is rather likely that further mark-to-market valuation losses on securities will be disclosed by LCBGs.

The continuous strengthening of profitability over recent years had allowed euro area banks to retain profits, which contributed positively to their capital ratios. Against this positive trend, recent turbulence-related reductions in retained income, as well as increases in risk-weighted assets, led to a slight weakening of the weighted average euro area LCBG Tier 1 ratio. Nevertheless, solvency measures exceeded the respective regulatory minima for these capital ratios for all euro area LCBGs at

**Chart 4.29 Turbulence-related loss in 2007 after-tax net income reported by large and complex banking groups**

(2007; € billions; maximum, minimum, interquartile distribution and median)



Sources: Individual institutions' financial reports and ECB calculations.

the end of 2007, which indicates a reasonable amount of remaining shock-absorption capacity among these institutions.

There are some indications that banks in the euro area have started responding to the losses they incurred in their investment exposures by tightening their lending standards and by cutting exposures to some riskier business lines, such as commercial real estate, leveraged buy-out financing and prime brokerage services offered to hedge funds. While such a risk reduction strategy could be seen as a rational reaction from an individual bank's point of view, collectively it may prevent leveraged market players from taking contrarian positions. Such contrarian positioning in the current circumstances could help stabilise the financial markets.

Looking ahead, as spillovers to asset markets and the real economy play themselves out, it can be expected that the euro area banking sector's profitability performance in 2008 will be adversely affected. Even if such spillover effects remained concentrated on the US macro-financial environment, the portfolios of LCBGs could be impacted, as demonstrated for example by the losses suffered by financial guarantors. In particular, factors that are likely to dampen profitability include the possibility of further valuation losses, increased funding costs, and declining

non-interest income from securitisation and financial market activities. Furthermore, it cannot be ruled out that future credit flows could be negatively influenced by persistently high funding costs and the significant drop in securitisation activity, although demand for private sector credit seems thus far not to have been materially affected in the euro area.

Market indicators are currently pricing in substantial risks for euro area LCBGs, although some of the indicators have shown a slight recovery since the end of the first quarter of 2008. A combination of funding liquidity risk (due to ongoing money market frictions), market risk (from ABS valuation losses) and tentatively also borrower credit risk (as reflected in the elevated levels of non-financial corporate sector CDS spreads, which also increase banks' hedging costs) is affecting the risk premia attached to banks by bond and equity market investors. This will further aggravate banks' funding costs. Ultimately, these factors are contributing to an increase in the probability of a systemic event, as perceived by market participants, which suggests that the period ahead will remain challenging for euro area LCBGs.

## 5 OTHER EURO AREA FINANCIAL INSTITUTIONS

The outlook for the euro area insurance sector deteriorated somewhat after the finalisation of the December 2007 FSR as pre-existing risks and challenges facing the sector increased. In particular, the financial market turbulence and possible spillovers to the real economy could pose challenges for many insurers. In addition, insurers that offer banking services or those firms which are part of financial conglomerates could be affected by challenges facing the banking sector. At the same time, non-life insurers continue to be exposed, together with reinsurers, to risks from catastrophic events. Nevertheless, generally favourable developments in the financial condition – including capital structures and solvency positions – of primary insurers and reinsurers in the second half of 2007, and for 2007 as a whole, have improved shock-absorbing capacities, thereby contributing to a generally stable outlook.

### 5.1 THE EURO AREA INSURANCE SECTOR

#### FINANCIAL CONDITIONS IN THE INSURANCE SECTOR

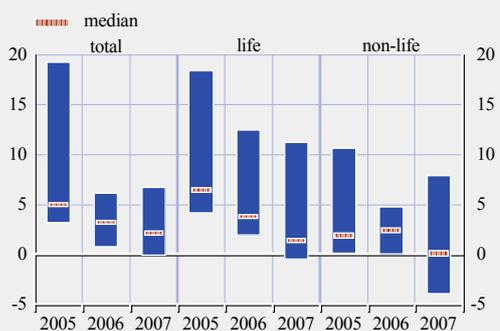
##### Financial condition of large insurers<sup>1</sup>

The financial condition of large euro area insurers in general improved in the second half of 2007 and in 2007 as a whole. Although most insurers witnessed premium growth, the increases were lower than in previous years and some insurers even suffered declines (see Chart 5.1). Growth in life insurers' premium income from unit-linked products – where the investment risk is borne by the policyholder – continued to be faster than for traditional products.

The cost containment and moderate loss increases reported for the first half of 2007 in the December 2007 FSR continued in the second half of 2007 and kept insurers' combined ratios below 100% (see Chart S119).<sup>2</sup>

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

(2005 – 2007; % change per annum; interquartile distribution)



Sources: Bloomberg and ECB calculations.

Premium growth for most insurers, moderate loss increases and cost containment contributed to the improvement in profitability among large insurers seen in the first half of 2007 continuing in the second half. The median return on equity reached 16.2% for 2007 as a whole, up from 14.8% in 2006 (see Chart 5.2). At the same time, the profitability of weaker performers improved with the distribution of profit performances becoming more skewed towards higher values.

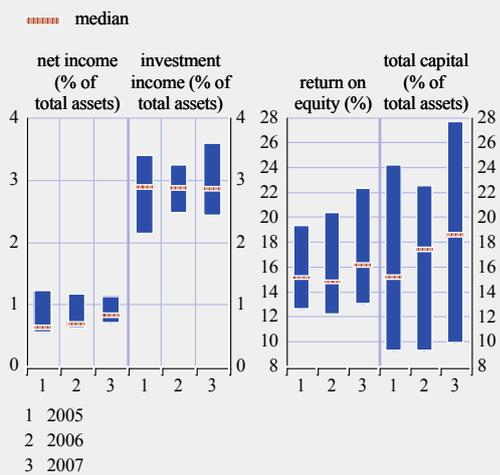
Profitability improvements of insurers were also supported by the stability of investment income during the year. Overall, investment income was little affected by the credit market turbulence as the exposures of euro area insurers to structured credit products referencing US sub-prime mortgages were limited. Nevertheless, most insurers did face write-

1 The analysis of the financial condition of large euro area insurers is based on the consolidated accounts of a sample of 30 listed insurers (composite, life and non-life insurers, and financial conglomerates with large insurance activities) with total combined assets of about €6 trillion. This represents almost 70% of the gross premium written in the total euro area insurance sector. However, at the time of writing, not all figures were available for all companies.

2 The combined ratio is calculated as the sum of the loss ratio (net claims to premiums earned) and the expense ratio (expenses to premiums earned). Typically, a combined ratio of more than 100% indicates an underwriting loss for the insurer

**Chart 5.2 Distribution of income, profitability and solvency for a sample of large euro area insurers**

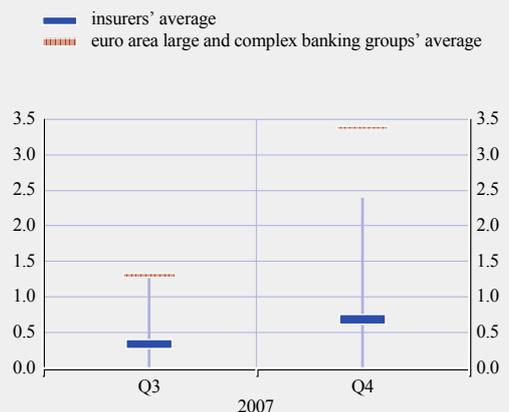
(2005 – 2007; interquartile distribution)



Sources: Bloomberg and ECB calculations.

**Chart 5.3 Profit and loss write-downs of selected euro area primary insurers and reinsurers**

(% of shareholders' equity, maximum-minimum distribution)



Sources: JPMorgan Chase & Co., institutions' financial disclosures and ECB calculations.

downs in the second half of 2007 (see Chart 5.3). Insurers with large banking activities generally had larger exposures and thus larger losses, but insurers' write-downs were in general lower than those recorded by many euro area large and complex banking groups.

It should, however, be noted that possible investment losses might not have been recognised in insurers' profit and loss accounts. This is because insurers' securities holdings are mainly classified as "available for sale" and therefore recorded at fair value on the balance sheet, but no loss is recorded in the profit and loss account unless it is considered an other-than-temporary impairment. This differs from banks which generally record most securities "at fair value through profit and loss", which means that the assets are marked-to-market through the profit and loss account.<sup>3</sup>

The overall improvement in the financial condition of insurers in 2007 contributed to a strengthening of solvency positions (see Chart 5.2). This was notable since several insurers distributed an unprecedented share of earnings to shareholders via share buybacks.<sup>4</sup>

The increased use of insurance securitisation during 2007 helped insurers (and reinsurers) to distribute risk exposures and thereby improve solvency positions. By the end of 2007 the size of the global insurance securitisation market had grown to around USD 38 billion, up from about USD 30 billion in 2006, and was thus one of the few structured finance segments that was not affected by reduced investor demand after the outbreak of the financial market turmoil in the summer of 2007. Indeed, some investors were attracted by the low correlation between insurance-linked securities (such as catastrophe bonds) and many other credit and financial market instruments.

#### Financial condition of major reinsurers<sup>5</sup>

The relatively strong demand for reinsurance during the first half of 2007 was not maintained

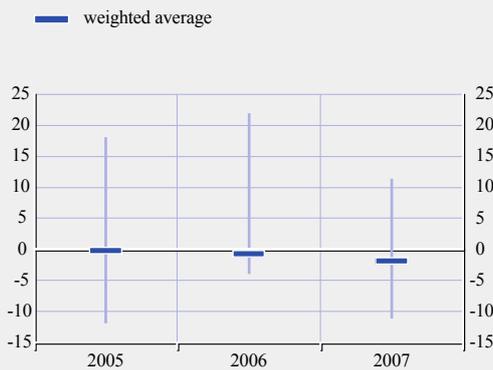
<sup>3</sup> See, for example, JPMorgan Chase & Co. (2008), "European insurance – Dividends look safe", April.

<sup>4</sup> For further details see ECB (2007), *Financial Stability Review*, December.

<sup>5</sup> The analysis of the financial condition of major euro area reinsurers is based on the consolidated accounts (also including primary insurance activity where applicable) of a sample of five 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 5.4 Distribution of gross-premium-written growth for a sample of large euro area reinsurers**

(2005 – 2007; % change per annum; maximum-minimum distribution)



Sources: Bloomberg and ECB calculations.

in the second half, which led to declines in premiums written for 2007 as a whole for most reinsurers considered (see Chart 5.4). Relatively contained catastrophe losses during 2007 contributed to the reduced demand.

Together with the decline in premiums written, reinsurance prices also declined in general

during 2007 and continued declining, by about 9% on average, during the January 2008 reinsurance renewal season.<sup>6</sup> The financial condition of reinsurers was, however, supported by combined ratios of below 100% in 2007 for most reinsurers, as losses from claims only increased slightly – partly due to manageable losses from natural catastrophes – and expenses were contained (see Chart S112).

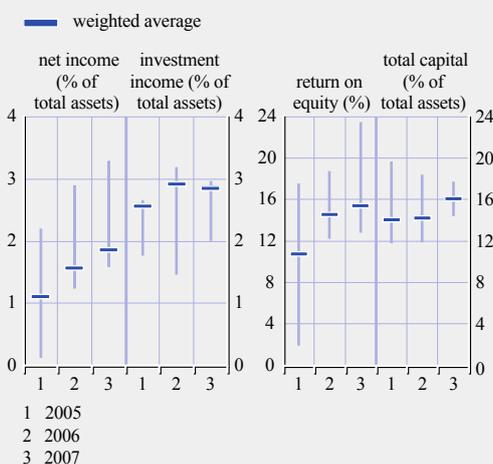
Also compensating for the reduction in premium income was investment income, which remained solid since reinsurers only had modest exposures to structured credit products referencing US sub-prime mortgages (see Charts 5.3 and 5.5).

At the global level, insured losses from natural disasters, which can affect both primary insurers and reinsurers in the euro area, almost doubled in 2007 to about USD 23 billion (see Chart 5.6). This was, however, significantly below the record set in 2005, which included hurricane Katrina,

6 There were, however, some exceptions, with UK flooding reinsurance prices in particular increasing by about 5% during the January renewal season due to the large losses in the summer of 2007.

**Chart 5.5 Distribution of income, profitability and solvency for a sample of large euro area reinsurers**

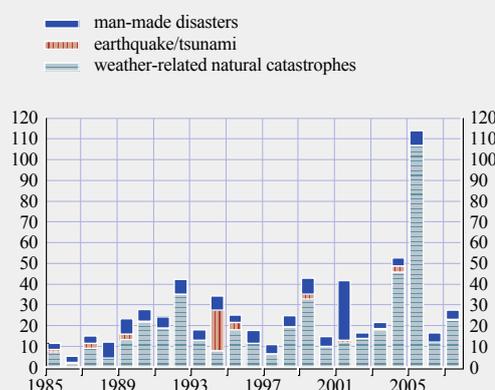
(2005 – 2007; maximum-minimum distribution)



Sources: Bloomberg and ECB calculations.

**Chart 5.6 Insured losses from natural catastrophes and man-made disasters**

(1985 – 2007; USD billions)



Source: Swiss Re.  
Note: Property and business interruption losses.

when insured losses exceeded USD 100 billion, and the costs endured during 2007 proved manageable for euro area reinsurers.

The strength of investment income together with moderate catastrophe-related losses underpinned profitability improvements among almost all reinsurers in 2007. The average return on equity increased to almost 16%, up from 14.6% in 2006, and the distribution remained skewed towards higher values (see Chart 5.5). Developments in the fourth quarter of 2007 and the first quarter of 2008 (for those reinsurers that had reported at the time of finalisation of this FSR) were, however, less positive and some reinsurers reported year-on-year decreases in net income during these periods.

The solid performance by euro area reinsurers in 2007 as a whole contributed to increased solvency positions (see Chart 5.5).

### RISKS FACING THE INSURANCE SECTOR

The risks insurers face can be classified into three broad categories: (i) technical risks, such as incorrect assessment of potential loss and risk (e.g. catastrophic events or life expectancies) leading to underpricing and risk concentrations; (ii) investment risks, such as potential losses from falling values of equity investments, low long-term bond yields and credit risks (non-payment by counterparties); and (iii) contagion and reputation risks for insurers that also provide banking and other services, are part of financial conglomerates or own banks or other financial institutions.

These risks can also be grouped into risks that are internal to the insurance sector and those that stem from the external environment.

The most significant risks that euro area insurers currently face include, in no particular order:

- Financial market risks

- Risks associated with a potentially deteriorating macro-financial environment
- Longevity risks
- Catastrophe risks
- Contagion risks from banking activities or ownership links to banks and other financial institutions
- Risk of reduced investor demand for insurance-linked securities
- Strong competition in some segments, together with an increased 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 instead potential and plausible events that could, should they materialise, materially impair the solvency of insurers.<sup>7</sup>

### External factors affecting insurers' resilience

As already highlighted in past FSRs, financial market risks are one of the most prominent types of risk facing insurers – mainly via their investment activities. Owing to the persistence of the turbulence in financial markets after the finalisation of the December 2007 FSR, the related risks for insurers remain.

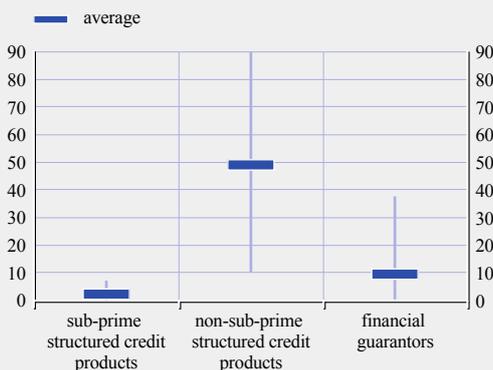
Thus far, however, financial market risks have not materialised to a great extent among euro area insurers. This is largely because available information suggests that euro area insurers have limited exposures to structured credit products referencing US sub-prime mortgages (see Chart 5.7).<sup>8</sup> The low exposures compared to, for example, some euro area banks could

<sup>7</sup> For a discussion of identification of risks for financial stability assessments, see, for example, J. Fell and G. Schinasi (2005), "Assessing Financial Stability: Exploring the Boundaries of Analysis", *National Institute Economic Review*, No 192, April.

<sup>8</sup> See also Box 17 in ECB (2007), *Financial Stability Review*, December.

**Chart 5.7 Credit exposures of selected euro area primary insurers and reinsurers**

(Q4 2007; % of shareholders' equity; maximum-minimum distribution)



Sources: JPMorgan Chase & Co., institutions' financial disclosures and ECB calculations.

Note: Structured credit exposures include exposure to asset-backed securities, mortgage-backed securities, collateralised debt obligations and collateralised loan obligations.

Financial guarantor exposures include exposures to wrapped structured credit products and municipal bonds, direct investments, and reinsurance exposures.

possibly be explained by the fact that insurers often try to match the risk-return profiles of their liabilities and assets by, for example, aligning currency and domicile of assets and liabilities. This could explain the rather low appetite for US structured finance products. A further explanation is that insurers improved their risk management significantly after the large losses endured during 2001 and 2002 and they have since then become more prudent in their tolerance of risk.

Exposures to non-sub-prime structured credit products are, however, in some cases large and therefore a source of vulnerability should credit market problems spread further. Moreover, some euro area insurers could face losses from their links to the troubled US "monoline" financial guarantors (see also Box 4 in Section 1.3). Some euro area insurers have rather large exposures to securities insured by financial guarantors, have invested in the guarantors themselves, or have used the financial guarantors as a source of reinsurance (see Chart 5.7).

Further contributing to financial market risks are the significant investments in equities that insurers generally have (see Chart S124).

Insurers face risks of losses and higher hedging costs should the currently challenging stock market environment persist in the period ahead.

It should, however, be borne in mind that even if euro area insurers have exposures to structured credit products and large equity investments, they are likely to be less affected by potential mark-to-market losses than other investors because their long-term (or buy and hold) investment strategies mean that they face a lower risk of being forced to sell assets when markets are weak, provided that they are not forced to sell securities to meet solvency requirements if ratings of securities have been downgraded.

The financial market turmoil is, however, also likely to bring with it some investment opportunities for insurers as the general reappraisal of risks has increased, for example, expected returns on corporate bonds and structured finance products. This might also lead to some insurers needing to take less risk than before to achieve high returns.

A further financial market risk is the risk of low government bond yields which is still facing life insurers in particular, given the still large stock of guaranteed return contracts in many euro area countries, of which the duration is often longer than that of the covering assets. Although the level of guaranteed return has already declined in most euro area countries, due to a gradual shift to unit-linked products, the large volume of outstanding policies that were sold in the past with high guaranteed returns will continue to weigh on profits until the existing portfolio of policies has matured.

A further risk for which the likelihood of materialisation increased after the finalisation of the December 2007 FSR is the risk associated with a potentially deteriorating macro-financial environment (see also Section 2). This could affect insurers negatively in four main ways. First, insurance underwriting is usually supported by a favourable economic environment which drives the demand for insurance from both households and firms. A deteriorating economic

environment therefore has the potential to reduce underwriting business for insurers.

Second, insurers' could be affected if conditions in the non-financial corporate sector deteriorate, resulting in losses on insurers' investments in corporate bonds and structured credit products.

Third, some (mainly life) insurers also extend loans to households and firms and would be exposed to greater credit risks if credit market conditions in these sectors were to deteriorate.

Fourth, insurers often have significant exposures to commercial property markets as real estate gives them diversification benefits in their investment activities.<sup>9</sup> Some commercial property markets are showing signs of deterioration, and potentially worse economic conditions are likely to weaken at least some commercial property markets further (see Section 2.3). This could in turn negatively affect insurers' direct (e.g. property ownership) and indirect (e.g. investment in property funds) investment in commercial property.

Looking further ahead, life insurers and life reinsurers continue to face the risk posed by an ageing population and increasing life

**Table 5.1 Number of Atlantic hurricanes and storms recorded and forecasts for the 2008 season**

	Historical average	2007	2008 forecasts	
			Colorado State University	Tropical Storm Risk
<b>Atlantic</b>				
Named storms	11	14	15	14.8
Hurricanes	6	5	8	7.8
Major hurricanes	3	2	4	3.5

Sources: Colorado State University and Tropical Storm Risk.

expectancy, which give rise to longevity risks. This can lead to reserve deficiencies in insurers' annuity books and might lead to greater risk-taking in insurers' investment activities. In the longer term, longevity has the potential to result in higher accumulated claims (above estimates) than possible claims resulting from a large mortality event, such as pandemic influenza (see Chart 5.8).

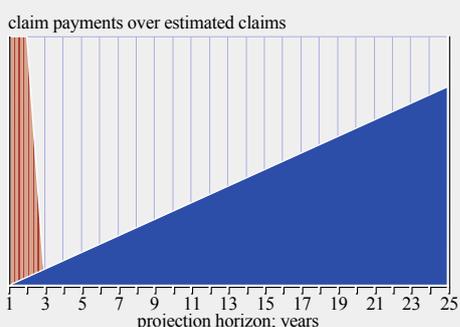
For non-life insurers and reinsurers, one of the most prominent risks remains the potential for losses from catastrophic events, either from natural sources or from terrorism. Globally active euro area insurers and in particular reinsurers could face losses caused by hurricanes and storms in the Atlantic region as the forecasts for 2008 are for above average activity (see Table 5.1). In addition, large losses caused by storms, flooding and wildfires in Europe during 2007 showed that losses from natural catastrophes can also be generated in Europe (see Box 17 for a discussion of what types of risk euro area reinsurers are insuring and where).

Looking further ahead, population increases, intensive settlement in high-risk areas, rising property values, higher insurance penetration and climate change are factors that are likely to increase insured losses from natural disasters in the future.

**Chart 5.8 Potential deviations from insurers' mortality assumptions**

(claim payments over estimated claims)

— longevity  
 ■■■■ e.g. pandemic event



Sources: International Association of Insurance Supervisors and ECB calculations.

9 Direct commercial property investment accounts for €103 billion – or an average of 2.5% – of the total assets of euro area insurers. See also ECB (2007), “Commercial property investment and financial stability”, *Financial Stability Review*, December.

Box 17

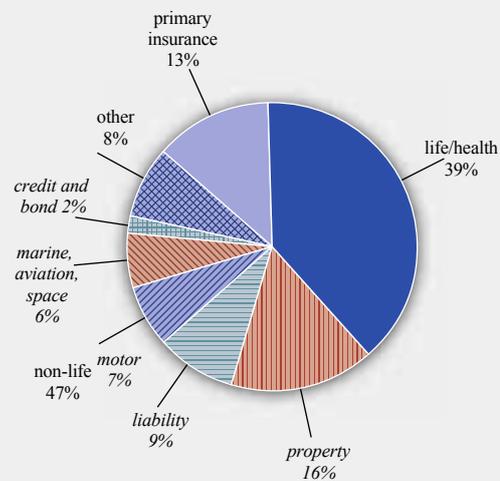
WHAT ARE EURO AREA REINSURERS INSURING AND WHERE?

Reinsurers are important for the stability of the financial system mainly because they are of systemic importance to the primary insurance market. This is because they facilitate risk-spreading, mainly of extreme losses, from primary insurers. The systemic importance of reinsurers is, however, also due to the fact that the global reinsurance sector is dominated by a limited number of large companies (some of which are domiciled in the euro area) and the failure of one reinsurer would therefore have a significant impact on its many counterparties. In addition, reinsurers have the potential to affect asset prices since they are large investors in financial markets. To diversify risk concentrations, most reinsurers are active globally and in a multitude of insurance segments.<sup>1</sup> This allows reinsurers to reduce the volatility of claims payments and thereby lower the sum of total risk capital required. To accurately identify potential losses facing euro area reinsurers it is therefore of importance to have information on reinsurers' underwriting risk exposures. This box presents information from reinsurers' annual reports on what reinsurers are insuring and where.<sup>2</sup>

Euro area reinsurers mainly reinsure non-life insurance (47%), followed by life/health insurance (39%). Some, however, also provide primary insurance (see Chart A). The non-life reinsurance segment can in some ways be seen as the most risky part of the reinsurance business, as losses and probabilities are often more difficult to assess and potentially very large. For example, natural catastrophes or terror attacks can cause very large losses on properties, which account for 16% of total insurance. Similarly, the insurance of ships, oil platforms, aeroplanes and satellites (6% of total insurance) can also result in extreme losses that are very difficult to predict. Furthermore, the financial market turmoil that erupted during the summer of 2007 is likely to trigger significant litigation against investors and investment advisors and is an example of how liability reinsurance (9% of total insurance) can affect reinsurers. Motor reinsurance (7% of total insurance) can, however, be seen as a more stable source of losses for reinsurers, as it is typically easier to estimate potential losses due to the more stable nature of motor insurance claims.

Chart A Type of insurance reinsured by selected euro area reinsurers

(2007; % of total gross premiums written)



Sources: Reinsurers' annual reports and ECB calculations.  
Note: Data for Cologne Re, Hannover Re, Mapfre Re, Munich Re and Scor.

1 Reinsurers can also cede risks to other reinsurers (called retrocession) – euro area reinsurers retroceded about 10% of gross premiums written in 2007 – or to capital markets by issuing insurance-linked securities.

2 This box is based on information for five large euro area reinsurers. They are Cologne Re, Hannover Re, Mapfre Re, Munich Re and Scor. They have combined total assets of about €290 billion, and they represent about 30% of total global reinsurance premiums.

Also life/health reinsurance losses are often easier to estimate and can often be seen as more of a capital management tool for primary life insurers. For example, life insurers reinsure annuity books where longevity risks have the potential to cause claims above what was predicted when policies were written. Significant death and morbidity losses can, however, occur as a result of extreme events, such as terrorist attacks or pandemic influenza, and give rise to unexpected losses for reinsurers.

Some reinsurers also provide primary insurance, mainly in the form of life/health insurance, mainly in the form of life/health insurance. The motivation for this is mainly to diversify the underwriting and to benefit from knowledge gained and products created for reinsurance.

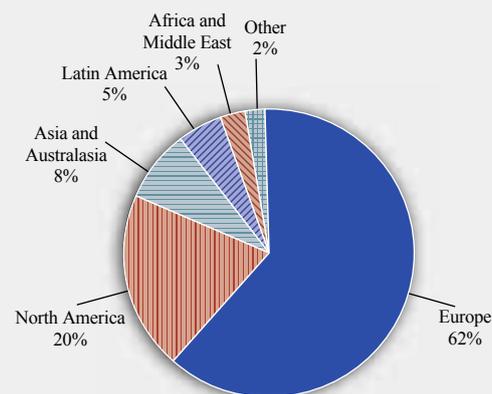
Turning to the geographical diversification of reinsurers' insurance underwriting, euro area reinsurers derive 62% of their total gross premiums written from Europe. 20% of total underwriting is, however, in North America, so the losses that euro area reinsurers could face as a result of, for example, hurricanes in the Atlantic are significant (see Chart B). Premiums written in other regions account for 18%.

Not only are euro area reinsurers active globally, but reinsurers located outside the euro area also underwrite business for euro area primary insurers and are therefore also of importance for euro area financial stability and the stability of the global financial system. For this reason, a complete euro area financial system stability assessment should also include the monitoring of major reinsurers outside the euro area.

To sum up, although domiciled in the euro area, euro area reinsurers are global companies, but with most of their underwriting in Europe and North America. In addition to their global diversification, reinsurers are also diversified in terms of what they reinsure. Diversification is generally positive from a financial stability perspective as it reduces risk concentrations. Nevertheless, the business of reinsurers is mainly to insure against extreme losses, which are often difficult to estimate and could severely impair reinsurers' solvency. The potentially extreme losses, together with reinsurers' systemic importance for the insurance sector as extreme risk absorbers and their important role as investors in financial markets, create a need to monitor the conditions of and risks facing reinsurers for the purpose of financial system stability assessments.

**Chart B Regional distribution of gross premiums written for selected euro area reinsurers**

(2007; % of total gross premiums written)



Sources: Reinsurers' annual reports and ECB calculations.  
Note: Data for Cologne Re, Hannover Re, Mapfre Re, Munich Re and Scor.

#### Internal factors affecting insurers' fragility

Business diversification of insurers can often be viewed positively from a financial stability perspective as it can reduce vulnerabilities to individual business lines. However, insurers engaged in, for example, banking

activities or insurers that are part of financial conglomerates can face particular risks in the currently challenging environment for banks. For example, contagion risks from banking activities or ownership links to banks and other financial institutions could be a source of risk

for some insurers through four main channels. First, losses faced by a banking entity could be material and thus also affect the group as a whole, including an insurance entity. Losses for some euro area financial conglomerates reported during the latter part of 2007 and early 2008 came predominantly from banking activities.

Second, a deterioration of conditions in a banking entity that leads to rating downgrades could affect the rating and thereby 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.

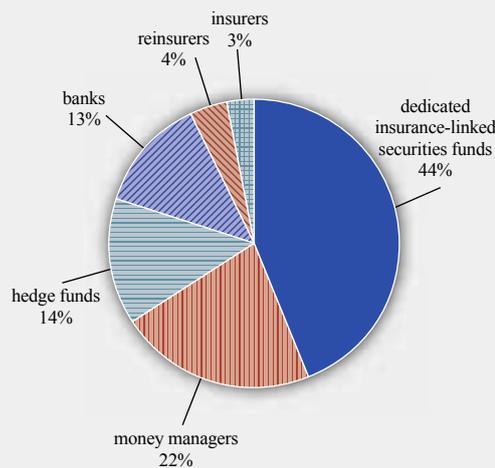
Fourth, there could be a reputation risk from, for example, losses or liquidity problems reported by a banking entity spreading to an insurance entity or the group as a whole.

As mentioned in previous FSRs, insurance securitisation can in general be viewed positively from a financial stability viewpoint as it allows insurers to spread risks and thus reduce potential vulnerabilities. Insurers relying too much on the strength of investor demand for insurance-linked securities might, however, prove vulnerable and face unforeseen capital charges if investor demand were to fall. Furthermore, insurance securitisation can also expose insurers to new risks to the extent that they have invested in the insurance securitisation market as part of their asset management, which could expose them to losses from insured events that are securitised. An increased use of insurance securitisation can also affect reinsurers negatively by lowering demand for their traditional reinsurance products, as securitisation can to some extent be seen as a substitute. However, insurance securitisation can also be a source of fee income for reinsurers that underwrite or provide management services for securitisation deals.

From a broader financial stability perspective, the spread of risks that insurance securitisation entails gives rise to new risks for investors, some of whom might not fully understand or be able

Chart 5.9 Investors in natural catastrophe insurance-linked securities

(2007; % of total)



Source: Swiss Re Capital Markets.  
Note: Information covering a market segment size of about USD 15.4 billion.

to bear potential losses. Little data are available on who is investing in insurance-linked securities and therefore who is ultimately bearing the risks that have been transferred from insurers. However, dedicated insurance securitisation funds, money managers, hedge funds and banks' proprietary trading desks are likely to account for the lion's share of investments. For natural catastrophe-linked insurance securities, some data show that dedicated insurance-linked securities funds account for the largest fraction of total investment, followed by money managers, hedge funds, banks and insurers (see Chart 5.9).

Looking ahead, the issuance of insurance-linked securities could increase further in the coming years, provided that investor demand holds up, in the run-up to the planned introduction of the Solvency II regulatory regime in 2012.<sup>10</sup>

Further potential risks that could lead to vulnerabilities for some insurers come from the continued competitive environment in the euro area insurance sector – in particular in the

<sup>10</sup> See, for example, E. Rozinka and V. Katsipis (2008), "Solvency II May Raise Most EU Insurers' Regulatory Capital Requirements", A.M. Best Research Special Report, April.

non-life sector – and competition between banks and life insurers. Together with an increased focus on creating shareholder value, as shown by the sometimes large share buybacks during the latter part of 2007, this could lead to increased risk-taking by insurers in their investments. It may also lead insurers to engage in cash-flow underwriting, whereby insurers write premiums not with the aim of increasing technical profit but to increase investment income when investing the new funds.

#### OUTLOOK FOR THE INSURANCE SECTOR ON THE BASIS OF MARKET INDICATORS

Starting in May 2007 and lasting until mid-February 2008, the share prices of euro area insurance companies fell more than the overall stock market. And although insurers' share prices had fallen by less than those of banks at the time of finalisation of the December FSR, they fell at a more rapid pace shortly thereafter (see Chart 5.10). These declines may possibly be linked to the problems among US "monoline" financial guarantors, which escalated shortly after the finalisation of the December FSR and

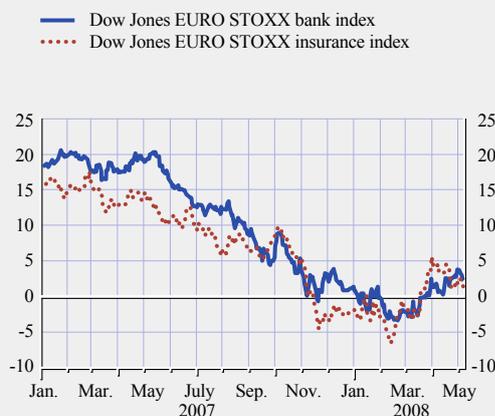
which seem to have affected the share prices of euro area insurers.

After February 2008, the stock prices of euro area insurers recovered somewhat. This improvement could possibly be linked to the fact that insurers' financial disclosures for 2007 showed that exposures to problem-struck structured credit products and financial guarantors were in general relatively modest compared to those of most euro area banks. However, insurers' share prices still point towards an uncertain outlook for the sector. This uncertainty was also visible in price-earnings ratios of euro area insurers, which declined to historically low levels (see Chart S131).

After the finalisation of the December 2007 FSR, share prices of non-life insurers, life insurers and reinsurers became more correlated than they had been before and also more correlated with the overall stock market. This suggests that the fall in share prices was caused by a general reappraisal of risks and, to a lesser extent, reflected investors' views on the outlook for the different insurance segments (see Chart 5.11).

**Chart 5.10 Share price developments for euro area banks and insurers relative to the Dow Jones EURO STOXX 50 index**

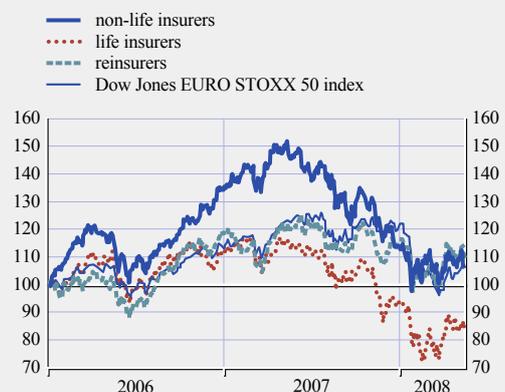
(Jan. 2007 – May 2008; cumulative % change; base: Dec. FSR cut-off date 9 Nov. 2007 = 0)



Source: Bloomberg.

**Chart 5.11 Dow Jones EURO STOXX total market and insurance indices**

(Jan. 2006 – May 2008; index: Jan. 2006 = 100)



Source: Thomson Financial Datastream.

Looking further ahead, the uncertain outlook for the euro area insurance sector one year ahead continued to translate into rising expected default frequencies (EDFs) of euro area insurers, although they remained at historically low levels (see Chart S126). This outlook was also implied in asset swap spreads between senior and subordinated insurance debt, which increased substantially after the finalisation of the December 2007 FSR and reached historic highs (see Chart S127).

All in all, patterns in market indicators after the publication of the December 2007 FSR continue to imply a less favourable and riskier outlook for the euro area insurance sector.

#### OVERALL ASSESSMENT

Broadly favourable developments in the financial conditions – including capital structures and solvency positions – of primary insurers and reinsurers in 2007 support a stable outlook for the euro area insurance sector. However, pre-existing risks and challenges for the sector have increased and contribute to a more uncertain outlook. Greater uncertainty is also signalled in forward-looking market indicators.

The most significant risks euro area insurers currently face include: i) financial market risks – including investment risks from equity and structured credit product exposures; ii) risks associated with a potentially deteriorating macro-financial environment; iii) longevity risks; iv) catastrophe risks, such as natural disasters and terrorist attacks; v) contagion and reputation risks from banking activities and ownerships links to banks and other financial institutions; vi) the risk of reduced investor demand for insurance-linked securities; and vii) risks stemming from strong competition in some insurance segments, together with an increased focus on creating shareholder value, which might lead to greater risk-taking.

It is important to bear in mind that solvency positions of euro area insurers have remained at adequate levels and in most cases improved

during 2007. This suggests that shock-absorbing capacities of insurers, in general, have improved in a way that should enhance their ability to weather the materialisation, should it occur, of any of the risks they currently face.



## 6 STRENGTHENING FINANCIAL SYSTEM INFRASTRUCTURES

*The recent market turmoil has also impacted on payment infrastructures. Settlement values and the volume of payment instructions have increased and some payment infrastructures, such as Continuous Linked Settlement (CLS), recorded all-time highs in terms of the volumes and values of transactions settled. Despite these developments, key market infrastructures processing and/or settling euro-denominated payment transactions have been able to adequately and flexibly manage the situation. Increased volumes and values have been handled properly without impairing the secure and efficient functioning of infrastructures, and appropriate measures, such as an increase in system processing capacity, IT housekeeping activities, or an event driven extension of operating hours, have been applied where necessary. It is particularly reassuring that, even in these turbulent times, the transition from TARGET to TARGET2 has progressed smoothly. The CLS system maintained its high level of robustness and resilience in the reporting period.*

This section assesses, from an oversight perspective, key payment infrastructures and related services relevant for the financial stability of the euro area and gives an update on their performance after the publication of the December 2007 FSR. The focus is on the Trans-European Automated Real-time Gross-settlement Express Transfer system (TARGET), with special regard to the smooth transition to the new integrated technical platform, TARGET2. Furthermore, significant developments in the CLS system, which is the most important offshore payment system settling euro-denominated payment transactions, are highlighted. Insight is also provided into the latest enhancement of the common oversight framework of the Eurosystem, i.e. the definition of oversight standards for Card Payment Schemes (CPSs). Finally, the section also presents the most recent oversight activities related to SWIFT, given its worldwide

importance as a provider of secure payment messaging services.

The Eurosystem oversight function will continue to perform regular assessments of key aspects of major euro payment infrastructures against its applicable oversight standards, focusing in particular on the monitoring of key indicators related to the main sources of operational and financial risks in these systems, including, inter alia, system availability, the number, cause and impact of incidents, and liquidity risk indicators.

### 6.1 PAYMENT INFRASTRUCTURES AND INFRASTRUCTURE SERVICES

#### OVERSIGHT OF PAYMENT INFRASTRUCTURES

The paramount objective of the oversight of payment infrastructures is to contribute to ensuring their smooth functioning. In order to achieve this objective, the Eurosystem oversight function has adopted a common oversight framework consisting of a set of high-level principles and standards. There are three main building blocks in the Eurosystem's oversight policy for payment infrastructures, notably the Core Principles,<sup>1</sup> the oversight standards applied for euro retail payment systems<sup>2</sup> and the business continuity oversight expectations for systemically important payment systems.<sup>3</sup> These standards have been developed and applied under two guiding principles: proportionality and a level playing-field. Proportionality means that the oversight standards and their practical application take due account of the systemic importance of the systems overseen,<sup>4</sup> meaning that less comprehensive and less stringent oversight requirements are applied to systems with less potential for causing systemic

1 See Committee on Payment and Settlement Systems (CPSS) (2001), "Core Principles for Systemically Important Payment Systems", BIS, January.

2 See ECB (2003), "Oversight standards for euro retail payment systems", June.

3 See ECB (2006), "Business Continuity Oversight Expectations for Systemically Important Payment Systems (SIPS)", June.

4 A payment system is considered to be systemically important if disruptions within it could trigger or transmit further disruptions in the wider financial system. The Eurosystem takes the view that every large-value payment system operating in euro is systemically important.

disruptions. The principle of a level playing-field ensures that at least the same minimum standards are applied to systems managed by the Eurosystem (e.g. TARGET and TARGET2) as those applied to privately operated systems.

In view of the integrated structure of TARGET2, the ECB oversight function leads and coordinates all TARGET2-related oversight activities in close co-operation with the participating national central banks (NCBs). In addition, the ECB performs the oversight of the EURO1 system operated by the clearing company of the Euro Banking Association, EBA CLEARING.<sup>5</sup> Following the principles of central bank cooperative oversight, as initially set out in the Lamfalussy report<sup>6</sup> and updated in the report on “Central bank oversight of payment and settlement systems”,<sup>7</sup> the ECB participates in the oversight of the CLS system and of SWIFT.<sup>8</sup>

## DEVELOPMENTS IN KEY EURO PAYMENT INFRASTRUCTURES

### TARGET and TARGET2

Technically, the first generation of TARGET was composed of the national RTGS systems of the euro area and some connected EU central banks, the ECB payment mechanism (EPM) and the “interlinking” system connecting these components. The new generation of TARGET, namely TARGET2, is 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. Although TARGET2 is *legally* structured as a multiplicity of RTGS systems operated by the individual central banks, the rules of the TARGET2 component systems are harmonised to the greatest possible extent.

The TARGET2 system was launched smoothly with the first group of national banking communities (AT, CY, DE, LV, LT, LU, MT and SI) on 19 November 2007. The second migration group (BE, FI, FR, IE, NL, PT and ES) was connected on 18 February 2008. At the time of finalisation of this FSR on 8 May 2008

the last migration group (DK, EE, GR, IT, PL and the ECB) was due to be connected to TARGET2 on 19 May 2008. In order to facilitate the smooth connection of their banking community to TARGET2, six NCBs (BE, DE, LT, PT, AT and PL) will continue to provide limited RTGS services via so-called proprietary home accounting (PHA) systems for a transitional period of up to four years.<sup>9</sup> Whereas the oversight of these applications remains the responsibility of the respective NCBs, it is performed in close cooperation with the TARGET2 oversight function owing to the tight interrelations between these PHA systems and the TARGET2 Single Shared Platform (SSP) in terms of, for example, liquidity management.

### Operational performance

There was a further increase in payment instructions processed in TARGET<sup>10</sup> in the period between October 2007 and December 2007,<sup>11</sup> both in terms of value and volume. The average daily value settled in TARGET reached €2.6 trillion and almost 392,000 payment instructions were processed on a daily average basis. TARGET handled around 90% of total euro payments settled in large-value payment systems in the euro area (TARGET, EURO1, PNS, POPS) in terms of value and 60% in terms of volume.

The operational performance of TARGET again achieved a high level of reliability in the period

5 The ECB is also the overseer of the STEP2 system of EBA CLEARING which is a pan-European euro retail payment system.

6 See BIS (1990), “Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten countries”, November.

7 See Committee on Payment and Settlement Systems (CPSS) (2005), “Central bank oversight of payment and settlement systems”, BIS, May.

8 The ECB also participates in a cooperative oversight arrangement with the Hong Kong Monetary Authority in relation to the euro RTGS system operated in Hong Kong.

9 In addition, CY, ES, GR, LU, MT and SI operate PHAs with limited functionalities and without providing RTGS services.

10 In order to ensure continuity, the overall figures presented for TARGET comprise data which includes (i) TARGET components of non-migrated NCBs and the non-migrated ECB Payment Mechanism (EPM), (ii) the TARGET2 SSP and (iii) the PHA systems of migrated NCBs.

11 Due to technical reasons, the figures refer to the last quarter of 2007 only.

between October 2007 and March 2008. The overall availability ratio of the system was 99.54%.<sup>12</sup>

The migration from TARGET to TARGET2 went well, and the first experiences with the live operation of TARGET2 have fulfilled the high expectations. The availability of TARGET2, including all SSP modules, was 100% in the last quarter of 2007 and 99.87% in the first quarter of 2008. This is promising and indicates that the new system is able to deliver sound and reliable operational performance, which is beneficial to the financial stability of the euro area.

#### Incidents

In the context of incident monitoring, the TARGET overseers pay particular attention to the analysis of incidents of a significant duration (classified as major incidents<sup>13</sup>). During the fourth quarter of 2007 and the first quarter of 2008, two incidents in two different TARGET components lasted more than two hours. In addition, one external event resulted in a delay in TARGET closing in order to allow an ancillary system settling in TARGET to properly complete its end-of-day settlement. The TARGET overseers performed a thorough assessment of the above cases and concluded that the incidents had been properly investigated and followed up by the system operator. The level of compliance of TARGET with the applicable Core Principles was not therefore adversely affected. It is worth mentioning, however, that the latter case has highlighted again the close interdependencies among various payment infrastructures. The root cause of this incident was a strike at the Central Bank of Greece, which started on 3 March 2008. The strike impacted the non-migrated Greek TARGET component (HERMES) for three consecutive days. During this period no TARGET payments to and from HERMES were possible. However, owing to the limited share of HERMES in the overall TARGET traffic (1.5% of the overall volume and value), there was no major problem reported for the smooth functioning of TARGET. Greek banks participating in the EURO1 system, which normally fund any EURO1 short positions

through TARGET payments via HERMES, managed to pay their short positions via another EURO1 bank outside of Greece. Due to a technical problem at EURO1 that was only indirectly related to the strike, TARGET closed one hour late on 4 March 2008.

#### Liquidity management

TARGET2 settles on a gross basis, but employs a liquidity optimisation process. The optimisation mechanisms (algorithms) include bilateral and multilateral offsetting and optimisation checks aimed at liquidity-saving gross settlement. The optimisation of the intraday distribution of payment flows is an important tool to ensure that there is sufficient liquidity in an RTGS system, since the liquidity of incoming payments can be used immediately to cover outgoing payments. The harmonised timing of payment flows throughout the business day might substantially reduce the overall level of liquidity risk in the system, thus helping to safeguard financial stability. It is noteworthy that the pattern of intraday payment flows in TARGET2 remained in line with liquidity guidelines agreed at market level.<sup>14</sup> In 2007, 22% of the value of inter-Member State payments had been settled by 10 a.m., 48% by 1 p.m. and 93% by 5 p.m. This pattern remained essentially unchanged during the recent market turbulence. This is also the case with respect to fluctuations in TARGET payment flows, which were, like in the past, mainly connected to periodical transactions, seasonal effects and some major public holidays.

#### Oversight assessment of TARGET2

In line with the Eurosystem's oversight policy, the TARGET2 oversight function, under the leadership and coordination of the ECB,

<sup>12</sup> This is the ratio of the time when TARGET is fully operational to the TARGET operating time.

<sup>13</sup> The TARGET oversight function classifies incidents as "major" if lasting more than two hours and/or resulting in a delayed closing of TARGET.

<sup>14</sup> The European banking community agreed in 1999 on the high-level guidelines to apply a synchronised schedule for sending euro payments via TARGET and any other euro payment systems (see the "FBE guidelines on liquidity management" published on the website of the European Banking Federation).

conducted an assessment of the TARGET2 design against the Core Principles and the Eurosystem's business continuity oversight expectations during the development phase of the system. In terms of scope, the oversight assessment of the TARGET2 design included the design of the SSP as well as the PHA systems of four NCBs (BE, DE, LT and PT) which will be used to provide RTGS services during the transition period. The PHA systems of two other NCBs (AT and PL) will be assessed in 2008.

As far as the SSP is concerned, a number of oversight findings were identified and will be followed up during 2008 on the basis of an agreed action plan. At this juncture, the TARGET2 oversight function concluded that TARGET2 is likely to fully observe all relevant Core Principles. The operations of relevant PHA systems that have been assessed are also in line with the Core Principles and will not have any adverse implication for the smooth operation of TARGET2.

The publication of the first comprehensive oversight assessment report on TARGET2 is envisaged in early 2009.

### CLS

CLS Bank International, which is incorporated in New York, offers the Continuous Linked Settlement (CLS) system, thereby acting as the settlement institution for CLS settlement members. CLS 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 (FX) transactions. Through its PvP mechanism, CLS virtually eliminates FX settlement risk.<sup>15</sup> Having started with seven currencies, at the cut-off date for this FSR, CLS was able to settle 15 of the world's most-traded currencies, including USD, EUR, JPY, GBP and CHF.<sup>16</sup>

CLS Bank is supervised by the Federal Reserve. The Federal Reserve is, as part of a cooperative oversight arrangement comprising the G10 central banks and the central banks

whose currencies are settled in CLS, also the central bank with primary responsibility for the oversight of CLS overall. The ECB is the central bank with primary oversight responsibility for settlement in euro by CLS.

In November 2007 the Federal Reserve, based on the absence of objections from overseeing central banks, granted regulatory approval to CLS Bank to extend its service to the settlement of single currency payment instructions relating to a limited set of financial instruments, i.e. non-deliverable forward (NDF) transactions and over-the-counter (OTC) credit derivative transactions.<sup>17</sup> The approval was subject to the continued compliance of CLS with the Core Principles and compliance with the applicable policies of individual central banks whose currencies are settled by CLS Bank. As regards the settlement of the euro, CLS Bank was able to demonstrate that CLS complies with the "Eurosystem policy principles on the location and operation of infrastructures settling euro-denominated payment transactions".<sup>18</sup>

In light of the fact that the Federal Reserve has, under its payments system risk policy, classified CLS as a systemically important payment system for which it requires regular self-assessments, CLS Bank published a CLS self-assessment in December 2007.<sup>19</sup> CLS Bank concluded that, overall, the system observes each of the applicable Core Principles.

15 FX settlement risk is defined as the risk that one party to an FX transaction will deliver the currency it has sold, but not receive the currency it has bought.

16 Subject to regulatory approval, CLS Bank envisages widening its currency coverage by including two new CLS-eligible currencies, the Mexican peso and the Israeli shekel, in the first half of 2008. At the cut-off date for this FSR, overseers had been assessing whether the inclusion of the two currencies would have any adverse implications on the continued compliance of CLS with the Core Principles or any applicable policy of overseeing central banks.

17 The Federal Reserve also approved CLS Bank's request to settle single currency payment instructions related to FX option premia. The launch of this service is expected in 2008.

18 See ECB (2007), "The Eurosystem policy principles on the location and operation of infrastructures settling euro-denominated payment transactions", July.

19 See CLS Group (2007), "CLS Bank International: Assessment of Compliance with the Core Principles for Systemically Important Payment Systems", December.

Considering the importance of CLS for financial stability in the euro area and the stability of the global financial system, three important issues should be noted: (i) from the Eurosystem's perspective, CLS is an offshore payment infrastructure, as it settles euro-denominated payment transactions outside the euro currency area; (ii) it is the largest euro payment infrastructure settling euro-denominated payment transactions outside the euro area; (iii) in terms of values settled, CLS has become the largest payment infrastructure worldwide.

Looking at the period between 1 October 2007 and 31 March 2008, CLS saw new peak volumes and values (see Chart S135). A new record volume of 1,140,644 sides occurred on 13 November 2007 following a USD and CAD currency holiday (the previous record was 905,478 sides on 19 September 2007).<sup>20</sup> On 19 March 2008 CLS settled a record value of USD 10,340 billion equivalent. The average number of sides settled in CLS during this period was 460,000 and the average total daily gross value was USD 4 trillion equivalent<sup>21</sup> (see Chart S135), eliminating FX settlement risk of approximately USD 3.85 trillion equivalent.<sup>22</sup> Net funding averaged USD 59 billion equivalent or 1.5%. The euro values settled via CLS in this period amounted to USD 800 billion equivalent, eliminating FX settlement risk of approximately USD 770 billion equivalent. By comparison, the average daily volume of payment instructions settled in TARGET in 2007 was 366,177 and the average daily value was €2.4 trillion. The continuous growth of CLS volumes and values has been largely driven by new participants, in particular third parties,<sup>23</sup> and increasing use by existing participants. The volumes and values of single currency transactions settled in CLS, i.e. the instructions relating to OTC credit derivatives and NDF transactions, are still negligible in relative terms but, in absolute terms (on average), have been constantly growing since CLS Bank began offering its settlement service for these instructions.

CLS continued to show a high level of robustness and resilience after the finalisation

of the December 2007 FSR. Settlement in CLS has always been completed for all payment instructions that were eligible for settlement, and CLS also achieved a 100% pay-out rate of funds in the currencies involved via the relevant RTGS systems, such as TARGET2. The high volumes experienced in recent months, however, have occasionally led to some delays in the business processes of CLS (e.g. delays in the issuance of pay-in schedules or in settlement members' required pay-ins). Overseers remain vigilant in ensuring that the operational capacity of the CLS system continues to also be able to handle exceptional market circumstances and exceptionally high numbers of payment instructions.

Looking at new developments in CLS since the finalisation of the December 2007 FSR (in addition to the introduction of the settlement service for single currency transactions), it is worth noting that, following the ECB's migration to TARGET2, the funding and defunding of euro positions in CLS now takes place via the ECB's component system of TARGET2 and no longer in the EPM, which was the ECB's component in the TARGET1 context. In line with the legal set-up of TARGET2, the ECB continues to hold the account of CLS Bank. As is the case for any ancillary system to TARGET2, CLS is expected to benefit from the high resilience of TARGET2 and its contribution to the stability of the financial system. Furthermore, CLS Bank is in the process

20 A foreign exchange trade has two transaction sides.

21 Figures include instructions related to single and multi-currency transactions. For multi-currency transactions, it should be noted that each settlement leg in each of the relevant currencies is counted separately and this is reflected in the volume and value figures.

22 The reduction in FX settlement risk is smaller than the values actually settled in CLS because participants trade down their positions in CLS via inside/outside swaps ("I/O swaps"), whereby two CLS settlement members conclude two opposite trades, one to be settled in CLS (the inside leg of the swap) and the other (the outside leg of the swap) to be settled outside CLS, e.g. via traditional FX settlement methods such as correspondent banking. Because the outside leg reintroduces FX settlement risk, the value of I/O swaps needs to be deducted from the values settled in CLS to obtain the true reduction in FX settlement risk achieved by CLS.

23 Third parties are institutions that are not members of the CLS system but have indirect access to it through CLS settlement members who agree to be responsible as principal for the third parties' payment instructions to CLS Bank.

of extending its services to the settlement of payment instructions related to single currency FX option premia in 2008. CLS Bank has also aligned CLS with the 2003 “Interagency Paper on Sound Practices to Strengthen the Resilience of the US Financial System” by establishing a full out-of-region capability.

Given the systemic relevance of CLS for the euro area and the global financial system, the ECB and the overseers engaged in the cooperative oversight of CLS will continue to carefully assess the system’s continued compliance with the Core Principles and applicable policies of individual central banks.

The December 2007 FSR gave some insights into the size, duration, concentration and control of FX exposures in the light of the consultative report of the Committee on Payment and Settlement Systems (CPSS) on “Progress in reducing foreign exchange settlement risk”. The final CPSS report was published in May 2008.<sup>24</sup>

#### ENHANCEMENTS TO THE EUROSISTEM’S COMMON OVERSIGHT FRAMEWORK

##### Oversight standards for card schemes

In January 2008 the Governing Council of the ECB approved the “Oversight framework for card payment schemes – standards”<sup>25</sup> which focuses on ensuring the safety and efficiency of four-party and three-party card payment schemes (CPSs)<sup>26</sup> offering services by debit and/or credit card in the euro area.<sup>27</sup> The standards are intended to foster the reliability of CPSs operating in the euro area, promote public confidence in card payments and maintain a level playing-field across the euro area in a unified market with respect to the applicable oversight standards for all CPSs operating within the euro area. The cards oversight framework consists of five standards which relate to legal issues, transparency, operational reliability, good governance and sound clearing and settlement processes. The five standards are:

(1) The CPS should have a sound legal basis under all relevant jurisdictions.

(2) The CPS should ensure that comprehensive information, including appropriate information on financial risks, is available to the actors.

(3) The CPS should ensure an adequate degree of security, operational reliability and business continuity.

(4) The CPS should have effective, accountable and transparent governance arrangements.

(5) The CPS should manage and contain financial risks in relation to the clearing and settlement process.

These standards have been developed on the basis of a “risk-based” approach aimed at addressing the types of risk to which the CPSs are exposed. While their materialisation does not normally have the potential to cause serious financial disruption and systemic effects, as encountered, for example, in the case of systemically important payment systems, they may nevertheless disrupt, at least temporarily, the functioning of the real economy by severely altering the capacity of economic agents to discharge their financial obligations. Thus CPSs should be protected against the risks that arise throughout the entire payment cycle. For instance, it is particularly important to put in

24 See Committee on Payment and Settlement Systems (CPSS) (2008), “Progress in reducing foreign exchange settlement risk”, BIS, May.

25 See ECB (2008), “Oversight framework for card payment schemes – standards”, January. For the purposes of the oversight framework, a CPS is the set of functions, procedures, arrangements, rules and devices that enable a holder of a payment card to effect a payment and/or cash withdrawal transaction with a third party other than the card issuer. The oversight framework covers the entire payment cycle, i.e. the transaction phase (including the manufacture of payment instruments and the processing of data) and the clearing and settlement phase; it accommodates concerns relating to both the retail payment system and the payment instrument used.

26 A four-party CPS involves as stakeholders 1) the issuer, 2) the acquirer, 3) the cardholder and 4) the card acceptor (in the case of ATM transactions, it is usually the acquirer that offers its services via the ATM). In a three-party CPS the issuer and the acquirer are always the same entity.

27 The framework includes a waiver policy that allows the Eurosystem to exclude CPSs below a certain size in terms of cards in issue and the annual average value of transactions from the application of the oversight standards.

place efficient and effective governance arrangements. Furthermore, owing to the nature of CPSs, the risk of loss of reputation might be greater than for other types of payment system and is likely to have a severe impact on customer confidence. The CPS oversight standards have a strong focus on operational risk. In addition to fraud or security risks, which are the most familiar operational risk to the public, the standards also focus on operational reliability and business continuity. Specific to CPSs in comparison to other electronic payment schemes is the fact that the oversight framework also comprises provisions regarding the manufacturing and distribution of cards. As the set-up of CPSs is quite diverse, the standards also cover technical aspects, roles and responsibilities within the scheme and the outsourcing of major scheme functions. Concerning legal risks, the standards take into account that CPSs might operate in a cross-border environment and thus are subject to different jurisdictions. Transparency is also a major issue as issuers, acquirers, cardholders and card acceptors who do not have sufficient information might not be able to adequately judge the risks they face as a consequence of participating in a scheme.<sup>28</sup>

The Eurosystem will launch an oversight assessment of all CPSs operating in the euro area in the second quarter of 2008. CPSs offering services solely at a national level will be overseen by the respective NCBs, while international CPSs will be subject to cooperative oversight carried out by joint assessment groups consisting of experts from NCBs and the ECB. A peer review shall follow the CPS assessments, for both national and international CPSs, with the aim of ensuring the consistency, comparability and objectivity of the assessment of all CPSs.

### OVERSIGHT OF INFRASTRUCTURE SERVICE PROVIDERS

#### SWIFT

SWIFT maintains two operating centres (OPCs) which are in Europe and the US respectively.

Both OPCs are active for processing and storing SWIFT messaging traffic on a worldwide basis.

In September 2007 the Board of SWIFT approved a “strategic re-architecture plan”. The core of the project is the establishment of an additional OPC in Europe. The project will be implemented in two phases. During Phase 1, which is targeted for completion by the end of 2009, an enhanced core messaging platform will be established to support the partitioning of SWIFT messaging into multiple zones. Initially, there will be two message processing zones, namely a European and a transatlantic one. This will be achieved with the establishment of a third OPC in Europe. Also during Phase 1 SWIFT will establish a new command and control centre in Asia for the remote monitoring of SWIFT operations running from the OPCs. In Phase 2 SWIFT will build a new global OPC in Europe by 2013. The new global OPC will be a companion site for OPC EU and OPC US and will store and process data from both the European and transatlantic zones.

SWIFT claims that the new architecture will further enhance the resilience of SWIFT’s infrastructure, while also increasing processing capacity. Moreover, data protection concerns will be overcome since intra-European data will be processed and stored exclusively at the locations in Europe, as has been requested by European data protection authorities.

The SWIFT overseers from the G10 central banks and the ECB aim to closely monitor the progress of this project and will assess possible operational risks stemming from it. Both SWIFT’s resilience and security levels should remain at a high level or even be improved, and current performance levels should be maintained.

<sup>28</sup> For example, clearing and settlement, fraud, chargeback obligations, etc.





## IV SPECIAL FEATURES

### A SECURITISATION, BANK RISK-TAKING AND LOAN SUPPLY IN THE EURO AREA

*This special feature examines whether securitisation activity and banks' risk-taking have had any impact on euro area banks' lending behaviour.<sup>1</sup> It finds this to be the case. In particular, based on a sample covering around 3,000 intermediaries over the first seven years of EMU, it is found that the favourable financial condition of banks together with strong securitisation activity seem to have diminished the importance of the bank lending channel and strengthened the ability of banks to supply loans. However, it is also found that this capacity depends upon business cycle conditions and, notably, upon banks' risk positions. In other words, deterioration in either could have an adverse affect on bank loan supply.*

#### INTRODUCTION

From virtual non-existence, securitisation activity expanded considerably in the euro area after the introduction of the euro (see Chart A.1). While this has been part of a global pattern, a number of euro area-specific factors have also played important roles in explaining the rise of securitisation activity. Among these, the closer integration of euro area

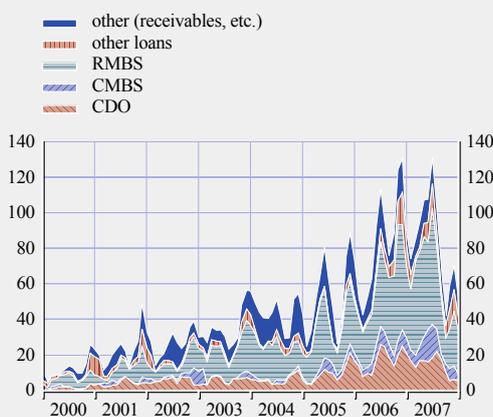
financial markets and a move towards a more market-based financial system have been of great consequence.

Securitisation allows banks to repackage the cash-flows generated by illiquid loans (and other financial claims) into tradable securities. By selling these securities into the financial markets, banks can shed the underlying credit risk while, at the same time, they can free up capital for further lending. Consequently, as securitisation is rowing in importance, banks are maintaining their key role as loan originators but their function as primary holders of the associated credit risk is declining in importance. In addition, securitisation has probably altered the monitoring function performed by banks.<sup>2</sup> In particular, by passing securities on from banks' balance sheets to the markets there could be fewer incentives for loan originators to screen borrowers. In the short term, this would contribute to an increase in bank lending. However, in the long term, the change in incentives could lead to higher default rates on bank loans.<sup>3</sup> In this vein, there is evidence from the United States suggesting that due to securitisation there has been laxer screening and looser lending standards in recent years, thereby altering how loan growth develops at a given interest rate level.

There are a number of ways in which securitisation activity can affect bank risk-taking incentives.<sup>4</sup> However, the direction in which securitisation activity affects bank risk-taking is not clear cut. It is important to make an assessment of this since

**Chart A.1 Euro-denominated asset-backed securities (ABS) issuance**

(Jan. 2000 – Jan. 2008; three-month moving sum; monthly data)



Source: Dealogic.

- 1 This special feature draws heavily on Y. Altunbas, L. Gambacorta and D. Marqués (2007), "Securitisation and the bank lending channel", Bank of Italy Working Paper No. 653, and Y. Altunbas, L. Gambacorta and D. Marqués (2008), "Banks' risk and monetary policy", mimeo.
- 2 See D.W. Diamond (1984), "Financial intermediation and delegated monitoring", *Review of Economic Studies*, Vol. 51, No. 3, and B. Holmström and J. Tirole (1997), "Financial intermediation, loanable funds, and the real sector", *Quarterly Journal of Economics*, Vol. 112, No. 3.
- 3 See J. Stiglitz (2007), "House of Cards", *The Guardian*, 9 October, B. Keys, T. Mukherjee, A. Seru and V. Vig (2008), "Did securitization lead to lax screening? Evidence from subprime loans 2001-2006", mimeo, and G. Dell'Árccia, D. Igan and L. Laeven (2008), "Credit booms and lending standards: Evidence from the subprime mortgage market", mimeo.
- 4 See R. Rajan (2006), "Has financial development made the world riskier?", NBER Working Paper No. 11728.

it is likely to have significant financial stability implications. On the one hand, securitisation activity allows banks to shift risks outside their balance sheet and achieve portfolio and funding diversification more easily.<sup>5</sup> On the other hand, it could also be a way to take on additional risks either by granting riskier credit or simply by acquiring more credit risk on the market.

Developments in securitisation activity and bank risk-taking incentives are likely to have contributed to a change in the way that banks grant credit to borrowers and in how they react to changes in interest rates. In particular, these changes in the role of banks would have a bearing on the importance of the “bank lending” or the “narrow” credit channel. Put simply, the bank lending channel focuses on how banks’ financial conditions have an impact on their ability and willingness to grant credit to borrowers and on how they respond to monetary policy changes.<sup>6</sup>

Given the importance of the banking sector as a provider of funds to households and non-financial corporations in the euro area, adverse effects on banks’ ability to supply loans (for example, as a result of financial market turmoil) may have serious repercussions on the euro area real economy. Empirically, however, it is difficult to measure the effect of banking sector financial conditions on loan supply by using aggregate data as it not easy to disentangle demand and supply factors. To date, this “identification problem” has been solved by claiming that certain bank-specific characteristics (such as size, liquidity and capitalisation) influence loan supply, while treating loan demand as being largely independent of them. After a monetary tightening, the loan supply response will, in principle, be less severe for large, liquid and well-capitalised banks.<sup>7</sup> For instance, large and well-capitalised banks have greater access to markets for unsecured funding, while liquid banks may simply draw down cash and securities to mitigate the effects of a drop in deposits.

From an empirical perspective, securitisation activity has probably altered those bank characteristics usually emphasised in the literature to identify shifts in loan supply.<sup>8</sup> The size indicator

is probably less significant because securitisation activity can considerably reduce the amount of loans on banks’ balance sheets. Liquidity can also be affected by securitisation because of the short-term inflows from the sale of asset-backed securities that modify the standard liquidity ratio. Securitisation activity may also reduce the required regulatory capital and make the standard capital-to-asset ratio a poor approximation of the relevant capital constraints faced by banks in this regard, as it would be easier for banks to alter their risk profile.<sup>9</sup> More broadly, securitisation provides banks with additional flexibility to deal with changes in market conditions associated with monetary policy movements.

In addition to the role of securitisation, empirically it is important to measure bank risk positions as accurately as possible. Risk-taking by banks – or the perceived creditworthiness of banks – is likely to play an important role in the transmission mechanism of monetary policy, and should therefore be considered and incorporated empirically.<sup>10</sup>

- 5 See ECB (2008), “Securitisation in the euro area”, Monthly Bulletin, February.
- 6 See B. Bernanke (2008), “The financial accelerator and the credit channel”, Remarks at the conference on “The credit channel of monetary policy in the twenty-first century”, Federal Reserve Bank of Atlanta. For a link between monetary policy and credit risk-taking, see G. Jiménez, S. Ongena, J.L. Peydro and J. Saurina (2007), “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.
- 7 For evidence on the bank lending channel, see T. Chami and T.F. Cosimano (2001), “Monetary policy with a touch of Basel”, IMF Working Paper No. 01/151, and S.J. Van den Heuvel (2007), “Does bank capital matter for monetary transmission”, *Federal Reserve Bank of New York Economic Policy Review*, May. For empirical evidence on the bank lending channel, see, for instance, L. Gambacorta and P. Mistrulli (2003), “Bank capital and lending behaviour: empirical evidence for Italy”, Bank of Italy Economic Research Paper No. 486.
- 8 With regard to the effect of securitisation on banks, see, for instance, W. Jiangli and M. Pritsker (2008), “The impacts of securitization on US bank holding companies”, mimeo. See also A. Martin-Oliver and J. Saurina (2007), “Why do banks securitize assets?”, mimeo.
- 9 In principle however, please note that the objective is to consider whether the general availability of securitisation as an additional source of funding matters for banks’ lending policy.
- 10 See B. Bernanke (2008), op. cit., C. Borio and H. Zhu (2007), “Capital regulation, risk-taking and monetary policy: A missing link in the transmission mechanism?”, presentation at the ECB conference on “The implications of changes in banking and financing on the monetary policy transmission”, Frankfurt, 29-30 November 2007.

## MODEL AND DATA

This special feature focuses on the effect of securitisation activity and bank risk on the bank lending channel in the euro area in recent years.<sup>11</sup> The model builds on existing evidence<sup>12</sup> and specifically accounts for securitisation activity. A loan equation is constructed using extensive microeconomic data. In this equation, the lending growth rate  $\Delta \ln(\text{Loans})$  is regressed on nominal ( $GDP$ ) growth rates (to control for country-specific loan demand shifts). The introduction of this variable captures cyclical macroeconomic movements and serves to isolate the monetary policy component of interest rate changes ( $\Delta i_M$ ).

The econometric specification also includes bank-specific characteristics, including size ( $SIZE$ ), measured as the log of total assets, liquidity ( $LIQ$ ) and capital position ( $CAP$ ). In addition, the securitisation activity indicator ( $SEC$ ) denotes the flow of securitised lending in year  $t$  divided by total assets at the end of the previous year.

Importantly, to proxy for banks' risk, two control variables are also inserted. The first variable represents loan loss provisions as a percentage of loans ( $LLP$ ). This variable represents an ex-post accounting measure of credit risk. The second is given by the one-year expected default frequency ( $EDF$ ) which is a widely used forward-looking estimator of credit risk computed by Moody's KMV.<sup>13</sup>

The econometric specification also includes four interactions between changes in the interest rate controlled by the monetary policy authority and bank-specific characteristics.

The model is given in the following equation:

$$\begin{aligned} \Delta \ln(\text{Loans})_{i,t} = & \alpha \Delta \ln(\text{Loans})_{i,t-1} + \sum_{j=0}^1 \delta_j \Delta \ln(\text{GDPN})_{i,t-j} + \\ & \sum_{j=0}^1 \beta_j \Delta i_{M,t-j} + \sum_{j=0}^1 \phi_j \Delta i_{M,t-j} * SEC_{i,t-1} + \sum_{j=0}^1 \sigma_j \Delta i_{M,t-j} * SIZE_{i,t-1} + \\ & \sum_{j=0}^1 \lambda_j \Delta i_{M,t-j} * LIQ_{i,t-1} + \sum_{j=0}^1 \chi_j \Delta i_{M,t-j} * CAP_{i,t-1} + \eta SEC_{i,t-1} + \\ & \kappa SIZE_{i,t-1} + \theta LIQ_{i,t-1} + \xi CAP_{i,t-1} + \tau LLP_{i,t-1} + \psi EDF_{i,t-1} + \varepsilon_{i,t} \end{aligned}$$

with  $i=1, \dots, N$ ,  $k=1, \dots, 12$  and  $t=1, \dots, T$  where  $N$  is the number of banks,  $k$  is the country and  $T$  is the final year.

The sample includes annual micro balance sheet data for around 3,000 of the largest euro area banks over the period between the introduction of the euro in 1999 and 2005. The data source is Bankscope, a commercial database from Bureau van Dijk. The sample covers around three-quarters of bank lending to euro area residents. Banks' balance sheet information is matched with securitisation activity from each issuer at the individual deal-by-deal level. Securitisation data are obtained from Dealogic, a commercial data distributor, and these are complemented with data from Standard and Poor's (S&P). Securitisation data cover the bulk of public ABS issued in Europe as well as funded cash (balance-sheet) CDOs issued by euro area originators.<sup>14</sup>

## RESULTS

The empirical results suggest that changes in economic activity have a positive and significant

11 Incentives for bank risk-taking might have been changing in the euro area in recent years due to a number of factors. Apart from securitisation and other forms of financial innovation, these would include changes in bank competition due to deregulation (and prudential re-regulation such as Basel II), increased pressure from shareholders to provide shareholder value or a greater reliance on market sources of funding. Overall, bank risk and securitisation considerations need to be carefully modelled when considering their possible effect on the supply of bank loans.

12 See I. Angeloni, B. Mojon and A. Kashyap (2003), *Monetary policy transmission in the euro area*, Cambridge University Press, and M. Ehrmann, L. Gambacorta, J. Martinez Pagés, P. Sevestre and A. Worms (2003), "The effects of monetary policy in the euro area", *Oxford Review of Economic Policy*, Vol. 19, No. 1.

13 EDFs are calculated by using financial market data, balance sheet information and Moody's proprietary bankruptcy database. The use of this measure allows the transfer of credit risk as perceived by the markets to be captured. EDF information is not available for all banks. From 1999 to 2005 the sum of total assets of banks for which Moody's KMV constructs EDF figures accounted for around 52% of the total assets of banks in the sample considered in this analysis. For banks that do not have an EDF, their default probability was approximated in two ways: 1) by means of a cluster analysis by year, country, bank's size and category; 2) estimating the missing values of the EDF using a regression model.

14 Securities need to meet two main criteria to be included. First, the bank originating the loans must pass them from their balance sheet through to the markets via asset-backed securities and, second, the bank must receive funding from investors from the sale of those securities.

effect on lending; better economic conditions increase the number of projects that become profitable in terms of expected net present value and hence increase the demand for bank credit from borrowers.

Banks' characteristics seem to have a bearing on bank lending. For instance, the riskiness of the credit portfolio has a negative effect on banks' capacity to increase lending. Other things being equal, higher loan loss provisions reduce profits and, therefore, have negative consequences for loan supply. A similar effect is detected for the expected default frequency. The mechanism suggests that banks' risk conditions matter for the supply of loans and it probably works by means of "market discipline" including the capacity of banks to issue riskier unsecured debt (i.e. bonds or CDs) which might be easier for less risky banks because they have more capacity to absorb future losses.<sup>15</sup> Securitisation activity reduces banks' funding needs and it is positively related to supplied lending.

The effect of liquidity and capital on lending indicates that liquid and well-capitalised banks have more opportunities to expand their loan portfolio.<sup>16</sup>

In terms of the effects of the bank lending channel, during the period of this study under normal circumstances securitisation activity and low levels of credit risk significantly reduce the effectiveness of the bank lending channel. At the same time it is important to bear in mind that during most of the sample period there was a stable macroeconomic environment with relatively low and stable interest rates, relatively low levels of non-financial sector loan delinquencies and a strong rate of growth in financial innovation. Nevertheless, the results suggest that even during this rather benign period, banks' risk positions mattered significantly for their lending behaviour. Moreover, the "buffering" effect of financial innovation on credit portfolios seems to have depended strongly upon banks' risk positions as well as on business cycle conditions. In this respect, simulation results<sup>17</sup> based on the

empirical model suggest that an extreme deterioration of bank risk, capital and securitisation conditions could indeed lead to significant impacts on loan supply.

## CONCLUDING REMARKS

Based on an extensive database of micro balance sheet information for the largest banks in the euro area which has been matched with information on banks' risk and securitisation activity, this special feature arrives at two important conclusions. First, the spectacular increase in securitisation activity in the euro area, coupled with the low level of bank risk and favourable financial conditions of banks, seem to have had a positive effect on the supply of credit after the introduction of the euro. Second, the effect depends on other factors and, crucially, on financial stability considerations. In particular, benign financial conditions of banks seem to have had a "sheltering" or "buffering" effect on bank loan supply. This effect, however, is found to be dependent both on banks' risk positions and on the stage of the economic cycle. In other words, the importance of the bank lending channel changes over time and deterioration in the business cycle or the financial condition of banks could have an adverse affect on bank loan supply.

15 Empirical evidence shows that lower capital levels are associated with higher prices for unsecured liabilities. See, for example, M.J. Flannery and J. Sorescu (1996), "Evidence of Bank Market Discipline in Subordinated Debenture Yields: 1983-1991", *Journal of Finance*, Vol. 51, No. 4.

16 On the contrary, consistent with Ehrmann et al. (2003), the effect for size is negative, and the role of size as an indicator of informational asymmetries appears to be quite poor. Several features of banking markets in the euro area (low number of banking failures, decreasing role of the government, presence of comprehensive deposit insurance schemes, network arrangements in groups, strong relationship lending between small banks and small firms) seem to diminish the usefulness of size as an indicator of (lower) informational friction.

17 Subject to a number of caveats such as the assumption of linearity on the impacts of banks' risk on loan supply.

## B WHAT EQUITY, CREDIT AND CREDIT DEFAULT SWAP MARKETS TELL US ABOUT THE RISK PROFILE OF BANKS

*Information from equity and credit market-based indicators of banks is commonly used for financial stability assessment. In this practice, it is often assumed that equity market-based indicators provide information on the markets' assessment of the outlook for, and the risks surrounding, future banking profitability. At the same time, for the credit-based indicators the prior assumption is that these provide information on the credit risk outlook for banks or the likelihood of bank failure. However, such indicators are likely to exhibit some co-movement owing to common drivers, such as the business cycle or interest rate changes. This special feature confirms that this is the case even for bank-specific (or idiosyncratic) equity and credit measures. In order to pin down the nature of the interaction between credit and equity markets and key macroeconomic drivers, a dynamic model is estimated, revealing a large role for a risk aversion driver, and a weaker one for changes in interest rates and oil prices. The analysis also finds that risk measures based on equity lead those stemming from the credit default swap (CDS) market.*

### INTRODUCTION

This special feature examines the information contained in equity and credit market-based indicators of banks which are commonly used for financial stability assessment in order to better understand what is driving them and to assess the complementarities that exist between them.<sup>1</sup> A common approach is to assume that equity market-based indicators reflect the markets' assessment of the outlook for and the risks surrounding the future trajectory of bank profits. For the credit-based indicators the prior assumption often made is that these embody the credit risk outlook for banks or the likelihood of bank failure. However, there are good reasons to believe that such indicators are likely to exhibit some co-movement owing to

common drivers, such as the business cycle or interest rate changes. Institution-specific factors are also likely to play a role in driving co-movement. For instance, a rise in the risk outlook for bank profits, reflected in a rise in the implied volatility of bank equity prices, will, all else being equal, increase the credit risk of banks as well. When this happens, typically a rise is also seen in the spreads on, for instance, subordinated bonds issued by banks. With these considerations in mind, two different aspects of the inter-relationship between a number of equity and credit-based indicators are examined. The first separates the common or systemic component of patterns in each indicator type for euro area large and complex banking groups (LCBGs) from the idiosyncratic components. Here, systemic components are common to all indicators, while the idiosyncratic components are institution-specific. This means, for example, if a bank had a weak business model, irrespective of general market conditions, it would be captured in the idiosyncratic component.

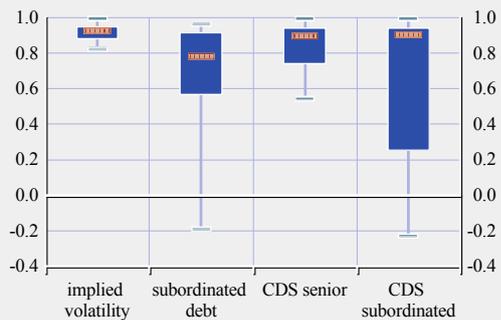
### SEPARATING SYSTEMIC FROM IDIOSYNCRATIC COMPONENTS OF EQUITY AND CREDIT RISK ACROSS LCBGs

Four different market-based measures are considered in this analysis: implied volatility extracted from equity call options,<sup>2</sup> subordinated debt spreads (ten-year horizon, or closest), and five-year credit default swap (CDS) senior and subordinated debt spreads. The measures of credit risk, the spreads on bonds and CDSs, are likely to exhibit differentiated degrees of liquidity, and as

- 1 See L. Norden and M. Weber (2004), "The comovement of credit default swap, bond and stock markets: An empirical analysis", CEPR Discussion Paper No. 4674, who find that the stock market generally leads the CDS market and bond markets and that the CDS market is more responsive to the stock market than the bond market. A. Berndt and A. Ostrovnaya (2008), "Do equity markets favor credit market news over options market news?", American Finance Association, 2008 New Orleans Meeting, also measure the joint contribution of the CDS and options markets to price discovery relative to the stock market.
- 2 This measure is calculated from a weighted average of the volatilities of the three call options closest to the at-the-money strike.

**Chart B.1 Dispersion of bilateral correlations between euro area large and complex banking groups across indicators**

(Apr. 2003 – Oct. 2007; minimum, maximum, interquartile distribution and median)



Sources: Bloomberg, Bondware and ECB calculations.

CDSs are typically more liquid they may reflect the risk of default more closely.<sup>3</sup> Inspection of bank-level data reveals very strong positive correlations for all risk measures across institutions. In particular, pairwise correlations of banks' implied volatility exhibit the highest median of 0.92, while subordinated debt shows the lowest at 0.78 (see Chart B.1). However, it is evident that a few pairs of banks correlate even negatively in the cases of subordinated and CDS subordinated bond markets.

This high degree of co-movement is suggestive of important common driving factors across institutions, motivating a decomposition of the risk measures into idiosyncratic and systemic components.<sup>4</sup> The statistical approach used in this special feature to accomplish this separation is principal component analysis (PCA). This is a dimension-reduction technique which enables the variance of a multivariate dataset to be decomposed into a linear combination of a number of unobserved factors common to all of the variables, plus idiosyncratic components specific to each variable. The common factors or principal components are constructed and ordered such that the first one explains the largest portion of the sample covariance or correlation matrix, the second one explains the next largest portion, and so on. The principal components are, by construction, orthogonal.<sup>5</sup>

The risk measure of the  $i^{\text{th}}$  bank,  $x_{i,t}$  may be decomposed into systemic and idiosyncratic components as follows:

$$x_{i,t} = \lambda_i F_t + \varepsilon_{i,t}$$

where  $\lambda_i$  is a vector of loadings on the common (or systemic) factors  $F_t$ , and  $\varepsilon_{i,t}$  represents the bank-specific component.<sup>6</sup>

The first common factor explains a large share of the co-movement across banks for each market. For instance, the first principal component of the banks' implied volatility captures 92% of their joint variation, that of subordinated debt spreads captures 76%, while those of the CDS measures lie between the above bounds.<sup>7</sup> These systemic components appear to capture well movements

3 Bond spreads from the secondary market depend on the available number and specifics of the outstanding bonds, and this is related to the new bond issue activity of firms. By contrast, the CDS market is more standardised (in terms of tenor, notional amount, currency) and less dependent on primary bond market issuances. Also, CDSs are more flexible as only premia have to be paid. This is why CDS rates are less likely to be affected by market illiquidity, tax and other microstructure effects that can affect corporate bond spreads. Finally, CDS traders can easily go long or short in credit risk, while shorting of bonds is more difficult. See L. Norden and M. Weber (2004), op. cit., and A. Berndt, R. Douglas, D. Duffie, M. Ferguson and D. Schranz (2005), "Measuring default risk premia from default swap rates and EDFs", BIS Working Paper No. 173.

4 For a recent example, see C. Hawkesby, I.W. Marsh and I. Stevens (2007), "Comovements in the equity prices of large complex financial institutions", *Journal of Financial Stability*, No. 2.

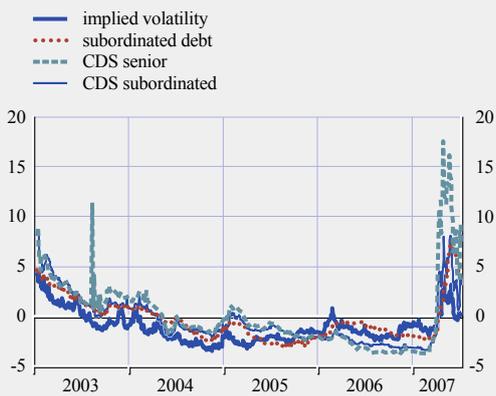
5 For an example of an application, see G. Connor and R. Korajczyk (1986), "Performance measurement with the arbitrage pricing theory: a new framework for analysis", *Journal of Financial Economics*, No. 15.

6 In this particular study, the convention is to take the principal components of the correlation matrix, rather than of the covariance one. In other words, variables have been normalised to have unit variance; otherwise a variable with large variance relative to the others would spuriously appear to have a higher correlation with the principal component.

7 The implied volatility series of fourteen banks for the period 2 September 2002 to 23 October 2007 were used. For subordinated debt spreads ten banks for the period 21 January 2003 to 16 November 2007 were used, for CDS senior debt spreads fifteen banks for the period 16 April 2003 to 24 October 2007 and for CDS subordinated debt spreads thirteen banks for the period 22 January 2003 to 24 October 2007. Only in the case of subordinated debt spreads does the second principal component show a weak statistical significance as depicted by the Jolliffe and Kaiser criteria. The Jolliffe criterion suggests cutting off once the percentage of joint variance explained reaches a certain threshold, for instance 80%, while the Kaiser criterion keeps eigenvalues greater than one if the correlation matrix has been employed.

**Chart B.2 Systemic risk depicted by principal components of equity and credit risk indicators of euro area large and complex banking groups**

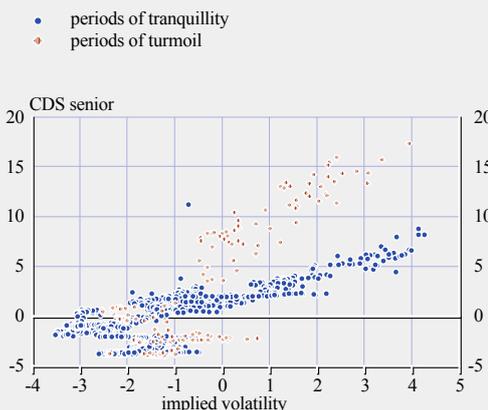
(Apr. 2003 – Oct. 2007)



Sources: Bloomberg, Bondware and ECB calculations.

**Chart B.3 Relationship between systemic implied volatility and CDS senior debt risk components**

(Apr. 2003 – Oct. 2007)



Sources: Bloomberg and ECB calculations.  
Note: Periods of turmoil are May 2005, May-June 2006, February-March 2007 and July 2007 onwards; other periods are periods of tranquility.

of systemic risk, in particular in periods of high uncertainty (see Chart B.2).

The systemic *content* of the variation of individual banks is similar across implied volatility and the CDS-based measures and very high, suggesting that euro area LCBGs appear highly sensitive to market movements.

The *association* of systemic equity and credit risk is easily seen in a scatter-plot (see Chart B.3).<sup>8</sup>

Even though significant diversity is observed in the nature of this relationship, episodes of financial turmoil, such as in May 2005, May-June 2006, February-March 2007 and especially from July 2007 onwards, are characterised by a higher correlation, in contrast to periods of relative market tranquillity when the relationship between equity and credit risk is less clear.

#### DO EURO AREA LARGE AND COMPLEX BANKING GROUPS TRANSMIT IDIOSYNCRATIC SHOCKS ACROSS MARKETS?

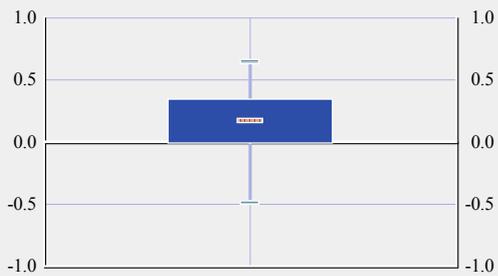
Even at the idiosyncratic level, there may be factors driving both equity and credit-based

measures. The economic rationale behind such a co-movement is straightforward: the payoff at maturity to the holder of a risky bond issued by a bank has the characteristics of a risk-free bond less the value of a put option on the bank's value. Hence, if equity volatility rises, so does the value of the put option, which reduces the expected payoff on the bond. This is reflected in a wider spread. This intuition comes from the Merton model that underpins the distance-to-default and expected default frequency approach. The extent to which idiosyncratic components across LCBGs show a degree of co-movement is pivotal for the assessment of systemic risk. If idiosyncratic components move in sync across markets, shocks in one market are reflected in movements in the other, meaning that uncertainty about the profitability outlook of a bank would intrinsically be related to its credit risk and thus the LCBGs serve as conduits for the transmission of shocks across markets – beyond the co-variation of systemic components.

<sup>8</sup> As the subordinated debt and CDS systemic components resemble each other fairly closely, CDS senior debt is chosen for the remainder to represent credit risk, as this measure embodies greater degrees of liquidity compared to corporate bonds and the data availability is richer.

**Chart B.4 Dispersion of coefficients in the relationship between idiosyncratic equity and credit risk components across euro area large and complex banking groups**

(Apr. 2003 – Oct. 2007; minimum, maximum, interquartile distribution and median)



Sources: Bloomberg and ECB calculations.

The analysis in this special feature rests on a general fixed-effects panel model:

$$cdsresid_{i,t} = c_i D_i + \beta IVresid_{i,t} + \varepsilon_{i,t}$$

where for the  $i^{\text{th}}$  bank,  $cdsresid_{i,t}$  is the idiosyncratic (or residual) component of the CDS senior debt spread,  $D_i$  allows the intercept to be bank specific, and  $IVresid_{i,t}$  is the idiosyncratic component of implied volatility of call options. The estimations suggest that the relationship between the idiosyncratic components across banks is weakly positive – the coefficient of  $\beta$  being 0.149 – and significant at the level of 1%. The fact that the association is positive but small suggests that each indicator provides marginal information that is not provided by the other. In other words, these findings would suggest that there is useful information in the idiosyncratic components extending beyond the Merton-type relationship. It would also suggest that it is better to consider patterns in several market-based indicators collectively in order to form a reliable assessment rather than focusing on one of them to the exclusion of the others.

Because restricting the coefficient  $\beta$  to be equal across banks could mask heterogeneity across banks, a model allowing this coefficient to vary across banks – thus fine-tuning fixed effects to take account of this heterogeneity – is also estimated:

$$cdsresid_{i,t} = c_i D_i + \beta_i (D_i * IVresid_{i,t}) + \varepsilon_{i,t}$$

Not surprisingly, there appears to be a varying degree of association across the banks (see Chart B.4).

Even though for the majority of the banks the association of the idiosyncratic components across markets is positive, strong and significant, a sample of banks exhibiting different results stands out. Specifically, for four out of thirteen euro area LCBGs considered in this analysis a statistically insignificant relationship between the idiosyncratic components is found at the level of 1%.<sup>9</sup> Out of the nine banks with significant association, seven show a positive relationship. The geographical and size specificity of the four banks exhibiting insignificant association suggests that, even though these banks operate globally, some geographical or size factor may underlie this result. It could also be of relevance that these banks exhibited very high debt-to-equity ratios during 2006 and 2007.

Overall, it is evident that for euro area LCBGs there is a significantly positive association between idiosyncratic equity and credit risks.

#### THE DYNAMICS OF THE SYSTEMIC RISK COMPONENTS AND THEIR INTERACTION WITH MARKET DRIVERS

Both systemic and idiosyncratic linkages across markets imply channels of transmission of shocks across markets. Identifying the nature of the causality would appear important, not the least as it could shed some light on whether the credit cycle may be reinforced through these channels. For instance, the relationship between the two types of risk may reflect the “pecking order” of cash-flow payouts that would create a natural delay in the transmission from equity-based to credit-based risk. An adverse shock to profits would result in lenders being affected last, as shareholders experience a direct hit through lower dividends. Hence, it seems intuitive that profitability strains will

<sup>9</sup> The standard errors are corrected for panel-specific autocorrelation and panel-level heteroscedasticity.

show up first in the equity-based indicators, as shareholders are subordinate to all other stakeholders in a firm.

The analysis at the systemic level is technically simpler for this investigation. In addition, the interaction with market drivers can be modelled explicitly at the systemic level. It also seems appropriate to exclude from the analysis the episode of financial turmoil that started in July 2007, as this very exceptional period is characterised by unusual drivers and possibly also dynamics (see Chart B.2).<sup>10</sup>

In order to motivate the analysis, a “reduced-form” (as opposed to “structural” market factors) model of the joint dynamics of the implied volatility and CDS senior debt systemic components alone is first investigated. As tests reveal that both indicators, at a daily frequency, exhibit non-stationary behaviour, and that a cointegrating relationship, which is significant at the level of 5%, exists between them, a vector error correction model (VECM) is used to model the dynamics.<sup>11</sup> Bearing in mind the possible problems of such reduced-form misspecification, the results indeed suggest that an increase in systemic implied-volatility-based risk results in a subsequent and persistent widening in the CDS-based systemic risk measure.<sup>12</sup>

The reduced-form model is enhanced with “market drivers” – the natural candidates being the three-month EURIBOR interest rate (measuring the cost of funds), a measure of investors’ risk aversion already developed and presented in earlier issues of the FSR (capturing the cycle as seen from the supply of funds side) and oil prices (a proxy of supply-side drivers) (see Chart B.5).<sup>13</sup>

Simple correlation measures of the five variables indicate that the relationship with risk aversion is greatest for implied volatility, while for both interest rates and oil prices it is higher with credit risk (see Table B.1).

**Chart B.5 Systemic risk measures of euro area large and complex banking groups and their market drivers**

(Apr. 2003 – July 2007)



Sources: Bloomberg, Chicago Board Options Exchange (CBOE), UBS, JPMorgan Chase & Co., Lehman Brothers, Westpac, Dresdner Kleinwort, Bank of America and ECB calculations.

In order to capture the dynamic interdependence of the equity and credit market measures with their risk drivers, a dynamic model was estimated. Like the systemic risk measures, drivers are also non-stationary, and cointegrating relationships are again detected; therefore the VECM specification is applied again. The structural model explains more of the variation in the credit market (31%) than in the equity market (7%), in line with the reduced-form model, but capturing more of the variation.

<sup>10</sup> The sample period for this part of the analysis is from 16 April 2003 to 13 July 2007.

<sup>11</sup> This model has been estimated with five-day lags, one less than the optimal number of lags determined by the Akaike Information criterion for the corresponding VAR representation. Moreover, since the data are not trending, the restricted constant case has been fitted. The outlier point for CDS spreads on 1 December 2003 has been excluded.

<sup>12</sup> Much of the variation in the credit market (but less of that in the equity-based options) is explained by the model: about 2% of the variation in the equity market is explained and 10% in the credit market.

<sup>13</sup> The risk aversion measure used is that of ECB (2007), “Measuring investors’ risk appetite”, *Financial Stability Review*, June. This measure is shown to drive financial market liquidity in ECB (2007), “Measuring financial market liquidity and risk aversion interdependence”, *Financial Stability Review*, December.

**Table B.1 Correlation of systemic equity and credit risk with risk drivers at various frequencies**

(Apr. 2003 – July 2007)

		Risk aversion	EURIBOR	Oil price
Daily	Implied volatility	0.484	-0.078	-0.532
	CDS senior	-0.182	-0.684	-0.837
Weekly	Implied volatility	0.482	-0.079	-0.532
	CDS senior	-0.202	-0.700	-0.846
Monthly	Implied volatility	0.483	-0.086	-0.538
	CDS senior	-0.243	-0.733	-0.859

Sources: Bloomberg, Chicago Board Options Exchange (CBOE), UBS, JPMorgan Chase & Co., Lehman Brothers, Westpac, Dresdner Kleinwort, Bank of America and ECB calculations.

**Table B.2 Summary of short-term dynamics of the VECM model**

(Apr. 2003 – July 2007)

Explanatory variables	Dependent variable in each equation				
	Implied vol.	CDS senior	Risk aversion	EURIBOR	Oil price
Implied vol.	4	10	-	-	-
CDS senior	-	6	-	-	-
Risk aversion	5	-	10	8	10
EURIBOR	8	-	-	5	-
Oil price	-	-	-	-	-

Sources: Bloomberg, Chicago Board Options Exchange (CBOE), UBS, JPMorgan Chase & Co., Lehman Brothers, Westpac, Dresdner Kleinwort, Bank of America and ECB calculations. Note: An entry denotes the highest lag with short-term coefficients of the VECM being significant at the 5% level.

Regarding the variables' short-run interdependencies, the measure of risk aversion appears to be a significant driver of the equity-based systemic measure, which itself is a driver of movements in CDS spreads. All in all, a shock in risk aversion translates into important rises in equity risk, with impacts being persistent as they last for at least five days (see Table B.2).

As in the reduced-form specification, credit risk is quite responsive to shifts in equity risk, even after ten days, and the relationship is positive for almost all of the lags. Conversely, no significant effect appears to run from credit to equity risk. These findings certainly mirror the aforementioned pecking order of cash-flow payouts, which suggests that when a profitability shock occurs strains will first appear in the equity risk measures and only gradually transmit to the credit-based risk ones.

There is mixed evidence on the effect of interest rates on the equity-based measure, and no indication of a significant effect on the credit risk in the short run. In the immediate aftermath of a rise in oil prices, the equity risk measure responds positively, but the effect is only significant at the 10% level.<sup>14</sup>

The long-term behaviour of the variables reveals important and intuitive structural relationships. The Johansen test for cointegration suggests that

two equilibrium relationships among the five variables exist in the long run (see Table B.3).<sup>15</sup> The coefficients of the cointegrating vectors imply that, in the long run, increases in risk aversion are associated either with an increase in equity risk or credit risk or both. In the context of the "market" as a whole, this result would seem obvious – the measure of risk aversion being itself the main common component in the movements across several markets.

The second stationary long-run equilibrium suggests that higher interest rates are associated with lower systemic credit risk among LCBGs. This result stands in contrast to general results documenting a negative relationship between movements in interest rates and credit spreads in the short run and no clear behaviour in the

<sup>14</sup> When extending the sample until the end of September 2007 to include data from the recent turmoil, risk aversion drives equity risk in a much more persistent manner and even the credit market directly; oil prices also appear to explain some variation in implied volatility in the immediate aftermath of a shock. These inspections confirm the expectation that during stress points risk is driven by shocks in variables that would not otherwise affect it so significantly.

<sup>15</sup> Both the trace and maximum eigenvalue tests reject the null of rank being equal to 1 at the 1% level, while the maximum eigenvalue test does not reject the null of rank being equal to 2 at the 1% level. The tests were carried out with twelve lags, as that was indicated to be optimal by the log-likelihood criterion, provided the maximum lag is again twelve, and a restricted constant. The lag lengths that minimise the Akaike and Bayesian Information Criteria are three and two respectively.

**Table B.3 Long-term relationship between equity risk, credit risk, risk aversion, three-month EURIBOR rates and oil prices**

(Apr. 2003 – July 2007)

	First	Second
Implied volatility	-0.0224	0.0063
CDS senior debt spreads	-0.0229	-0.0286
Risk aversion	0.0674	0.0462
EURIBOR	0.0003	-0.0010
Oil price	0.0296	0.0034

Sources: Bloomberg, Chicago Board Options Exchange (CBOE), UBS, JPMorgan Chase & Co., Lehman Brothers, Westpac, Dresdner Kleinwort, Bank of America and ECB calculations.  
Note: The darkest grey shade refers to significance at 1%, medium dark to significance at 5%, light grey to 10% and unshaded refers to insignificance at any level.

long term.<sup>16</sup> It suggests, however, that the maturity transformation function of this group of banks is important, as higher interest rates reduce risk.

## CONCLUDING REMARKS

A decomposition of commonly used equity and credit-based risk measures for euro area LCBGs into systemic and idiosyncratic components confirms previous findings that systemic components show substantial co-movement. Looking at the drivers of these common factors reveals that risk aversion is a significant driver of equity risk, with the impact transmitting to credit risk in a rather persistent manner. Interest rates and oil prices are found to have a weak association, at least in the short term. The results confirm a long-run relationship between risk aversion (a summary market measure) and the two LCBG-specific risk measures. Indeed, a general rise in the level of risk aversion is associated with increased levels of implied volatility and credit spreads in the long term.

This special feature also reveals that there is still a significant, weakly positive co-movement between the idiosyncratic components of credit and equity risk for the majority of euro area LCBGs. The fact that the association is positive but small suggests that each indicator provides marginal information that is not provided by the other. In other words, these findings would suggest that there is useful information in the

idiosyncratic components extending beyond the Merton-type relationship.

All in all, the findings indicate that great care should be exercised in interpreting patterns in market-based indicators as part of a financial stability assessment. Analysing patterns in many indicators should be done first and foremost for cross-checking of the interpretation, but also for assessing how different events shape the risk profile of banks.

<sup>16</sup> See M. Lin and J. Curtillet (2007), "Another look at the relation between credit spreads and interest rates", *Journal of Fixed Income*.

## C HOW HAS CDO MARKET PRICING CHANGED DURING THE TURMOIL? EVIDENCE FROM CDS INDEX TRANCHES

*The general repricing of credit risk which started in summer 2007 has highlighted significant problems in the valuation of collateralised debt obligations (CDOs). This special feature analyses the determinants of movements in CDS index tranche premia. The main finding is that the repricing of credit risk led to a heightened impact of risk aversion and liquidity measures on market prices. Overall, the results imply that even in the most liquid segment of the CDO market, market prices still contain a sizeable liquidity premium.<sup>1</sup>*

### INTRODUCTION

CDOs, which represent repackaged credit portfolios, can be classified into “bespoke” structures and index-based, i.e. standardised, instruments. In a bespoke CDO transaction, an investor can choose the CDO’s underlying portfolio or the structure of cash flows. For most of these instruments, their specific features limit the development of an active market and so investors ordinarily hold these securities until maturity. Valuation therefore relies on theoretical pricing models. By contrast, in the standardised CDO segment the underlying credit portfolio is based on a credit index such as the iTraxx index of euro-denominated credit default swaps (CDSs). This standardisation and transparency has fostered active trading in index products. Therefore, market participants frequently use the market prices of these index-based CDOs, which are also known as CDS index tranches, as a basis for the valuation of many bespoke CDOs. Hence, CDS index tranches can be viewed as representing the “tip of the iceberg” of the entire CDO market segment.

This special feature applies regression analysis to investigate the fundamental factors explaining the variation of the market prices of iTraxx tranches. To explain the log differences of the tranche premia a variety of financial market variables are used, including proxies for overall

credit risk, credit risk correlation, the risk-free interest rate and measures of market liquidity. Whether tranche premia are linked to a proxy for risk aversion is also tested. Furthermore, the analysis focuses on how the turmoil in credit markets which started in summer 2007 has affected the pricing of the index tranches. This leads to some preliminary conclusions on changes in CDO pricing more generally.

The market turmoil which started in summer 2007 has rekindled doubts concerning the validity of currently available CDO pricing models. Many market participants could not correctly price or measure the risks in instruments which are sensitive to credit risk correlation. These weaknesses in existing models provide an additional underpinning for the approach taken in this analysis, as it is not based on a specific pricing model, but instead tests the explanatory power of variables which should in theory influence market prices.

One of the main findings of the analysis is that declining risk appetite and heightened concerns about market liquidity, both of which have characterised investor behaviour since summer 2007, have provided a sizeable contribution to the observed strong increase in tranche premia.

The rest of this special feature is organised as follows. The first section briefly discusses the mechanics of CDS index tranches and the sample used. The second section describes market pricing during the turmoil. In the third section the potential determinants of tranche premia variation are discussed. The results of the empirical analysis are summarised in the fourth section. The last section offers some concluding remarks.

<sup>1</sup> This special feature is a summary of the analysis in M. Scheicher (2008), “How has CDO market pricing changed during the turmoil? Evidence from CDS index tranches”, ECB working paper, forthcoming.

## THE MARKET FOR CDS INDEX TRANCHES

The iTraxx CDS index, which started trading in June 2004, provides the underlying asset for the corresponding tranches. These index CDSs essentially trade like CDSs on a single firm. In the event of a firm's default, the defaulted firm is removed from the index portfolio and the nominal value of the contract declines by 1/125 (0.8%). According to market information, trading activity is concentrated in the five-year maturity and therefore this horizon is the focus of the following analysis. In addition, the analysis focuses on the "on-the-run" series, which is rolled over every half year to the new index composition according to the current poll's ranking of firms.<sup>2</sup>

Given the present iTraxx index composition, the corresponding standardised CDO comprises instruments with varying degrees of exposure to the joint loss distribution of the 125 firms. These tranches therefore provide claims on the cash flows of the iTraxx CDS portfolio and in parallel serve as protection for a certain range of defaults in the portfolio. The equity tranche serves as the first level of protection against any defaults among the firms in the index and is therefore also called the "first loss piece". Specifically, the six iTraxx main index tranches are Equity (ranging from 0% to 3% of the joint loss distribution), Low Mezzanine (3% to 6%), Mid Mezzanine (6% to 9%), High Mezzanine (9% to 12%), Super Senior (12% to 22%) and High Super Senior (22% to 100%).

Collectively, the six tranches represent the entire capital structure of the CDS index portfolio and can be interpreted as options on the joint loss distribution. In total, the six tranches cover all the possible losses arising from defaults in the CDS index portfolio. In parallel, all cash flows from the CDS index portfolio are paid out, starting from the senior tranches and ending with the equity tranche. Tranche trading takes place in the over-the-counter market among banks and brokers. Because the instruments are constructed like synthetic single-tranche

CDOs, investors can buy or sell all tranches individually.

Tranche premia are very sensitive to the default correlation between the firms in the portfolio because this correlation directly influences the distribution of risk in the capital structure. In particular, tranche premia depend on the joint loss distribution of the underlying portfolio and, given all other parameters, the default correlation determines the shape of this distribution. As the default correlation changes, the corresponding movement in the shape of the joint loss distribution is directly transmitted to the relative allocation of portfolio credit risk between equity, mezzanine and senior tranches.

A rise in the credit correlation represents a scenario of increasing systematic and therefore decreasing firm-specific risk in the credit portfolio. Thus, it can be interpreted as increasing risk of a general downturn in the economy rather than the default of a particular firm or a sector. In this scenario, the probability mass moves from the centre to the tails of the joint loss distribution of the iTraxx portfolio. These fatter tails of the loss distribution imply that the likelihood of the realisation of few as well as many credit events increases. Under this scenario, the overall shape of the joint loss distribution leads to a decline in the equity premium, because the buyer of the equity tranche is not required to make a payment in the absence of defaults. This mechanism explains why market participants equate buying an equity tranche with a long position in credit correlation: rising correlation lowers the equity tranche premium and therefore raises the mark-to-market value of the position. As regards the mezzanine segment of the CDO capital structure, there is generally no unambiguous effect of the correlation on tranche premia.

<sup>2</sup> For more details and references see ECB (2006), "The information content of CDS index tranches for financial stability analysis", *Financial Stability Review*, December 2006.

## THE BEHAVIOUR OF CDS INDEX TRANCHE PREMIA DURING THE TURMOIL

Two snapshots of the iTraxx tranche premia for 29 January 2008 and 23 January 2007 are shown in Table C.1. All premia are expressed in basis points. This premium is the amount which the investor in a specific tranche (the “protection seller”) receives from the protection buyer as compensation for covering the losses tied to that tranche.

At the end of January 2008, the iTraxx index traded around 70 basis points. This means that it cost around €70,000 annually to obtain insurance for a portfolio of €10 million of European investment-grade corporate debt. In contrast, one year earlier, with the premium at 23 basis points it cost less than this amount for the same insurance.

There are large differences in individual tranche premia due to differences in their inherent sensitivity to portfolio credit risk. At the end of January 2008, for instance, the tranche providing exposure to the 12% to 22% segment of the loss distribution paid 59.5 basis points annually; the 9-12% tranche paid 117 basis points and the equity tranche 1,243 basis points. Thus, for taking on the first loss piece of the capital structure of the default insurance for the iTraxx portfolio, the equity investor would have been compensated with an expected annual payment of around 12.5% of the notional amount.

After market participants started their reassessment of the pricing of credit risk in the summer of 2007, investment-grade premia jumped upwards over a short period of time, leading to large mark-to-market losses. All tranche premia widened significantly, although the severity of the changes differed across the capital structure. Table C.1 shows that between 23 January 2007 and 29 January 2008, equity tranche premia rose from 750 basis points to 1,243 basis points, whereas the premium on the 12-22% tranche rose from 2.25 basis points to around 60 basis points. A similar sharp

**Table C.1 Tranche premia for iTraxx Europe Main five-year on 23 January 2007 and 29 January 2008**

(basis points)		
Instrument	23 Jan. 2007	29 Jan. 2008
<i>iTraxx Main IG Index</i>	23.00	70.00
Equity 0-3%	750.00	1,243.00
Mezzanine 1, 3-6%	40.00	294.00
Mezzanine 2, 6-9%	12.00	188.00
Senior 9-12%	6.00	117.00
Super senior 1, 12-22%	2.25	59.50
Super senior 2, 22-100%	0.95	19.50

Sources: JPMorgan Chase & Co. and ECB calculations.

increase was observed for the 22-100% tranche where the premium increased from around 1 basis point to around 20 basis points.

These movements imply that investors became seriously concerned about losses hitting even the higher components of the capital structure of the iTraxx index tranches. Tail risk plays a large role in determining the values of senior and super-senior tranches.<sup>3</sup> Hence the pattern of price changes in the less risky parts of the CDO capital structure over the last year can be interpreted as representing a reassessment of the weight of large, low-probability loss events.

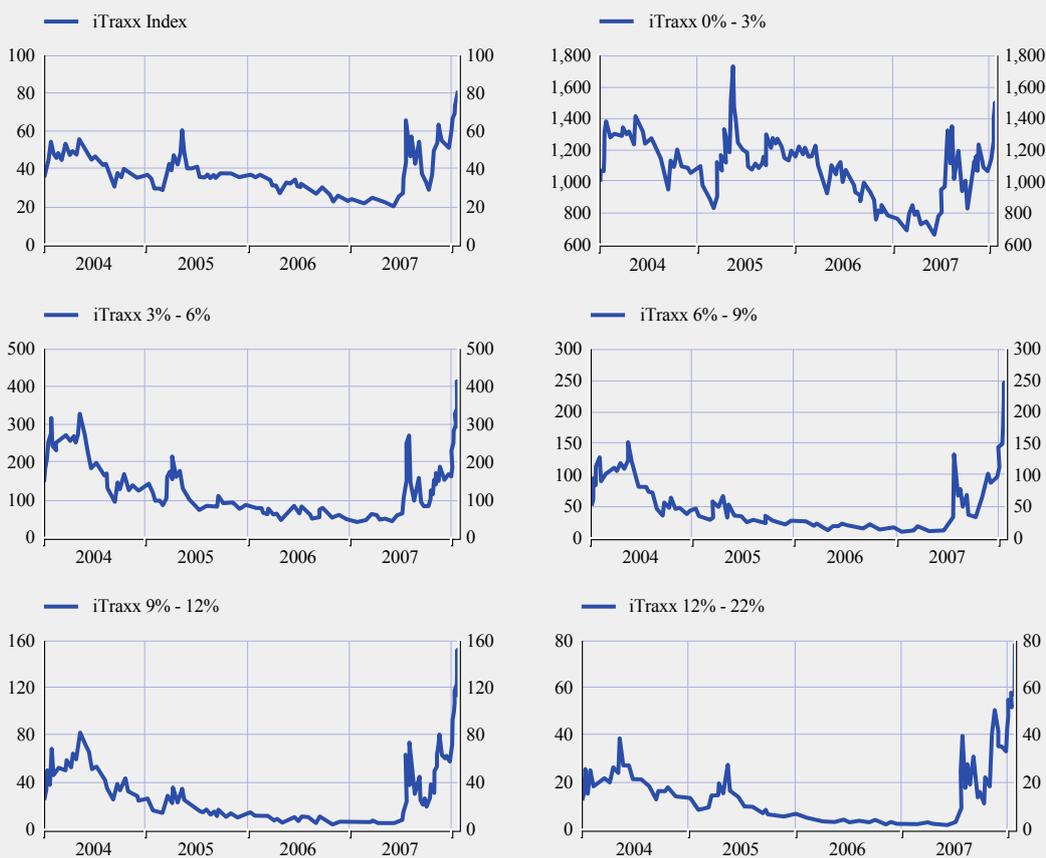
The sharp spike in the second half of 2007 is also visible in Chart C.1, which plots the time series of the index and the corresponding five tranches since the start of trading in the first half of 2004.<sup>4</sup> The chart also shows that the market turmoil which started in summer 2007 had a much more severe impact on market prices (with the exception of the equity tranche) than the May 2005 period of high volatility, when the downgrading of the US automobile companies Ford and General Motors triggered substantial turbulence in the credit market.

<sup>3</sup> See J. Coval, J. Jurek and E. Stafford (2007), “Economic catastrophe bonds”, Harvard Business School Working Paper No 07-102.

<sup>4</sup> The super senior 22-100% tranche is not included.

Chart C.1 Time series of iTraxx index and tranche premia

(basis points)



Sources: JPMorgan Chase & Co. and ECB calculations.

### THE DETERMINANTS OF CDS INDEX TRANCHES

In the literature on the modelling of credit spreads, econometric analysis of the explanatory factors of credit spreads has been used by many authors, starting with Collin-Dufresne et al.<sup>5</sup> The advantage of this approach is that it can use a much wider set of explanatory factors such as, for example, liquidity factors or proxies for risk aversion. Furthermore, it is not constrained by the specification of a particular theoretical model, but rather provides a data-based approximation to such a theoretical model.

The analysis in this special feature includes factors which serve as inputs in pricing models, namely proxies for credit risk and for the

movement of the risk-free interest rate. The main components of a CDO pricing model are a specification of the firm-level default process, the default co-movement and assumptions about the dynamics of the risk-free interest rate.<sup>6</sup> In addition, some other factors, which previous research has found to be significant determinants of credit spreads, are included. Furthermore, the analysis focuses on how the impact of the pricing factors changed after the start of the market turmoil in July 2007.

5 See P. Collin-Dufresne, R. Goldstein and J. S. Martin (2001), "The determinants of credit spread changes", *Journal of Finance*, 56, 2177-2207.

6 See, for example, F. Longstaff and A. Rajan (2006), "An empirical analysis of the pricing of Collateralized Debt Obligations", NBER Working Paper No 12210, for an empirical study of the performance of theoretical pricing models.

Overall the following eight factors are used:

#### The CDS index

The level of the CDS index determines the expected loss and hence the central tendency of the joint loss distribution. Therefore, the log changes of the iTraxx index time series are included.

#### The credit risk correlation

The credit risk correlation determines the shape of the joint loss distribution. As discussed earlier, tranche premia are very sensitive to the credit correlation between the firms in the portfolio because this correlation directly influences the distribution of risk across the tranches.

The implied base correlation of the iTraxx equity tranche is used to measure credit risk correlation. This measure is the simplest estimate of the homogeneous asset value correlation in the index portfolio. Furthermore, the base correlation is also the market standard for expressing default co-movement in CDO portfolios.<sup>7</sup> To avoid potential endogeneity problems in the econometric specification the lagged correlation change is used.

#### The risk-free interest rate

Changes in the risk-free interest rate are in general negatively related to credit spreads, and whether the same linkage also holds for tranche premia is tested. The theoretical explanation within the Merton (1974)<sup>8</sup> framework for a negative relationship proceeds as follows: first, a rising risk-free interest rate decreases the present value of the expected future cash flows, i.e. the price of a put option on the value of the firm decreases. Second, a rising risk-free interest rate tends to raise the expected growth rate of the firm value and hence a higher firm value becomes more likely. In turn, this implies a lower price of the put option on the firm value. Hence, both effects of increasing risk-free interest rates decrease the costs of insurance against default, i.e. the price of the put option on the firm value, which implies a smaller credit spread.

In the empirical application, the five-year euro swap rate is used as the risk-free interest rate because the tranche contracts have a maturity of five years and interest rate swaps are commonly seen as the market participants' preferred measure of the risk-free interest rate.<sup>9</sup>

#### The slope of the term structure

There is at least one linkage between the slope of the risk-free term structure and credit spreads: the slope of the term structure reflects the assessment of market participants about the economic climate because of the linkages between the term structure and investors' portfolio decisions. If investors expect the business climate to improve, they will shift some of their assets from short-maturity instruments into long-term bonds. This change in the portfolio composition will increase the short rate relative to the long rate, leading to a flatter slope of the term structure. A poorer macroeconomic outlook may lower demand for CDO investments, because investors may react to the increased likelihood of a general downturn by moving towards less risky assets such as government bonds.

In the empirical application, the slope of the term structure is defined as the difference between the ten-year and the one-year euro swap rates.

#### Risk aversion

As Eckner (2007) shows,<sup>10</sup> the tranche premia compensate investors not only for pure expected loss but also for systematic risk or jump risk. Hence, the market price of the tranches may change due to changes in investors' risk aversion, even if the underlying fundamentals (i.e. pricing under the "statistical measure") are unchanged.

7 See, for example, A. Elizalde (2005), "Credit risk models IV: Understanding and pricing CDOs", CEMFI working paper.

8 R. Merton (1974), "On the pricing of corporate debt: The risk structure of interest rates", *Journal of Finance*, 29, 449-470.

9 See F. Longstaff, S. Mithal and E. Neis (2005), "Corporate yield spreads: default risk or liquidity? New evidence from the credit default swap market", *Journal of Finance*, 60, 2213-2253.

10 A. Eckner (2007), "Risk premia in structured credit derivatives", Stanford University working paper.

The JP Morgan G-10 Risk aversion index is used in the empirical application. This index aggregates implied volatilities and measures for flight to quality into a single measure of the market participants' risk appetite.

### Swap spread

As a proxy for the liquidity risk premium in financial markets the swap spread, i.e. the yield differential between a ten-year interest rate swap and the benchmark German government bond with similar maturity is used. The swap spread contains a liquidity risk premium because it is affected by the funding operations of banks in the interbank market.<sup>11</sup> In addition it also contains a small default risk premium as the banks active in this market may have a non-zero default probability.

### Liquidity proxy

Longstaff et al. (2005) show that the non-default component in credit spreads is significantly positively related to average bid-ask spreads. Hence the second measure of market liquidity is the average bid-ask spread across five of the six tranches.<sup>12</sup> This measure should reflect common patterns in the market liquidity of the tranches.

### Yen exchange rate

In the period from 2000 onwards, many market participants used trading strategies called "carry trades". Such strategies rely on borrowing in a low-interest rate currency and investing the proceeds in higher-yielding assets. Specifically, the yen was commonly used as a funding currency. Thus, it is of interest to explore if movements in the JPY/EUR exchange rate affected the prices of tranches through effects on the cost of financing.

The sample comprises daily data from 23 September 2004 to 29 January 2008. The estimation is conducted with ordinary least squares analysis for each tranche separately. The dependent variable is defined as the log change in the tranche premium. Specifications with and without an interaction dummy for the turmoil period starting in July 2007 are evaluated.

Chart C.2 plots the time series of the levels of the explanatory variables. It illustrates a sharp upward movement in the bid-ask spread starting in summer 2007, which may indicate liquidity problems in the tranche market. An increase in the swap spread is also visible. The bid-ask spread also shows a temporary increase during the May 2005 market turmoil, whereas the swap spread reacted much less. The variation of the risk aversion measure showed a pronounced trend up to the summer of 2007.

### EMPIRICAL RESULTS

From the regression analysis, five results emerge.<sup>13</sup>

First, the CDS index has a large impact on the variation of all tranche premia. As hypothesised, the change in the index CDS premium enters the equations with a positive coefficient. A rise in this proxy for the expected loss in the underlying portfolio raises the tranche premia. In the iTraxx sample, the coefficient of the index change clearly increases with the subordination, with the biggest effect observed for the 6-9% tranche.

Second, the sign of the coefficient of credit correlation is negative for the first four tranches and positive for the highest tranche in the sample, namely the 12-22% tranche.<sup>14</sup> Hence, the relationship between tranche premia indeed depends on the subordination of the respective tranche.

Third, the five-year swap rate, the slope of the swap curve and the yen exchange rate do not have significant effects on tranche premia. In the overall regression, the risk aversion proxy also has only weak positive effects, mainly on the pricing of the equity tranche (albeit with a t-statistic of only 1.34).

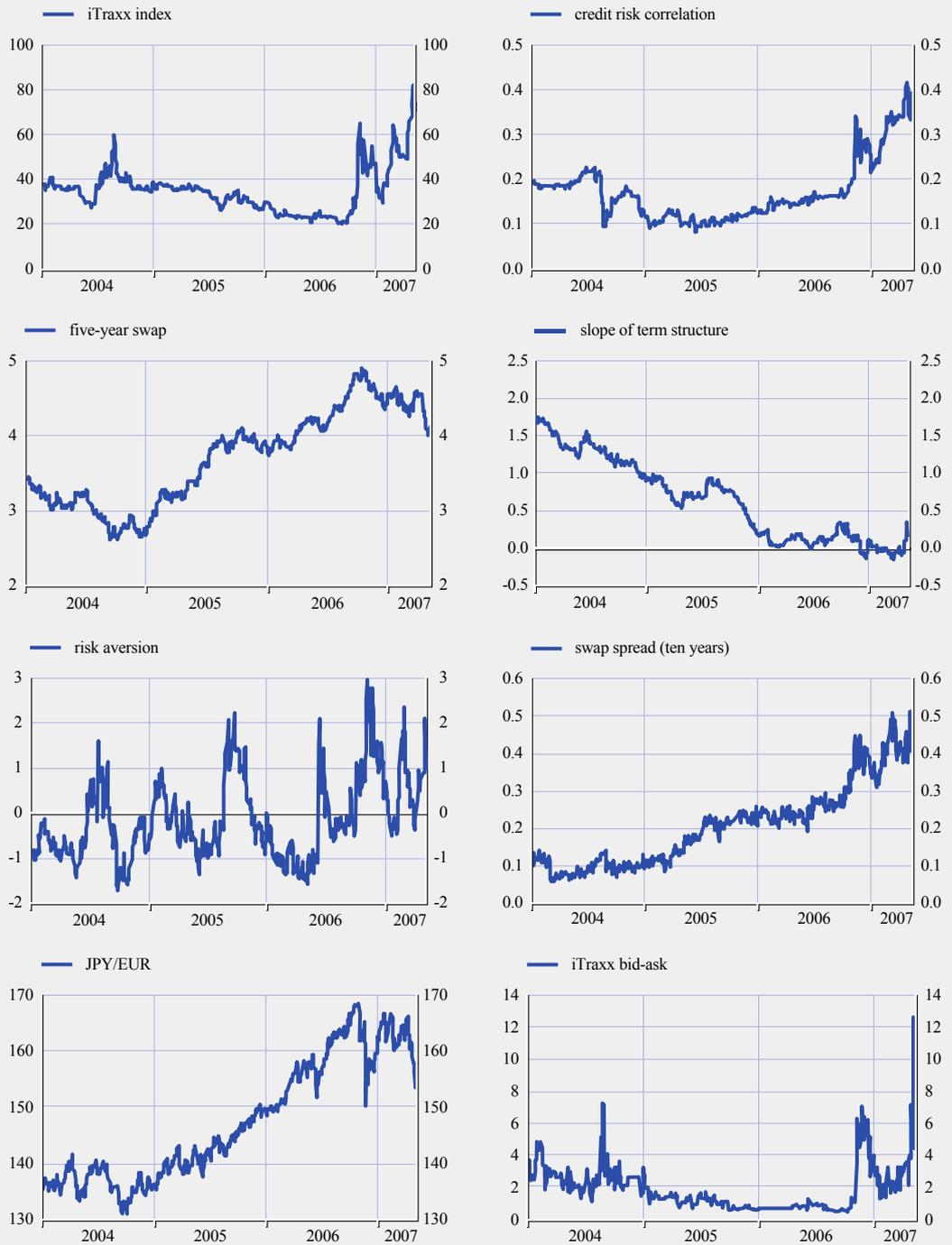
11 Y. Huang and S. Neftci (2003), "What drives swap spreads, credit or liquidity?", ISMA Center Working Papers in Finance, 2003(5).

12 The super senior 22-100% tranche is not included.

13 The tables can be found in Scheicher (2008), op. cit.

14 The super senior 22-100% tranche is not included.

Chart C.2 Time series of explanatory variables



Sources: JPMorgan Chase & Co. and ECB calculations.

Fourth, there are significant liquidity effects in tranche premia. The average bid-ask spread and the swap spread have statistically significant positive effects, with the former significant for all except the 6-9% tranche and the latter significant for all except the equity tranche. Hence, an increase in one of the proxies for liquidity raises all tranche premia.

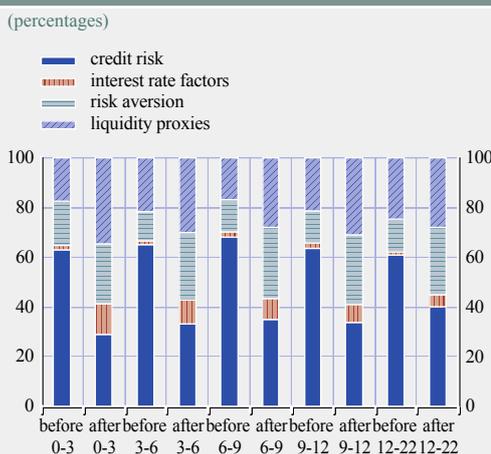
Fifth, the explanatory power of the market-based factors indicates a good fit of the regression model. The R-squared values of the iTraxx dataset are around 30% with the highest explanatory power for the 12-22% tranche.

After the overall regression analysis, the impact of the credit market turmoil on tranche premia is analysed. Understanding the specific factors and their role in driving the variation is important because changes in the weight of credit and non-credit-related elements may have different implications for the understanding of market pricing. For instance, indications about a declining risk appetite (i.e. risk preferences) provide a different signal of market perceptions than forecasts of rising future expected losses (i.e. statistical measures of risk).

To study the impact of the credit market turmoil on the pricing of standardised CDOs, this special feature focuses on changes in the weights of the pricing factors. For this purpose, the relative contribution of the R-squared goodness of fit measures of the block-wise regressions of the iTraxx tranche premia are compared. The four blocks are credit risk (index and base correlation), interest rate factors (level and slope), risk aversion (JPMorgan index) and liquidity risk (swap spread, bid-ask, yen). Chart C.3 shows the results of this analysis for two sample periods: August 2004 to July 2007 (“before”) and July 2007 to January 2008 (“after”).

The chart clearly shows the shift in the relative explanatory power among the four categories. The weights of risk aversion (as captured by the JPMorgan index) and liquidity risk both increased, whereas the role of credit risk declined in relative terms. For example, in the

Chart C.3 R<sup>2</sup> of block-wise regressions on iTraxx tranche premia



Sources: JPMorgan Chase & Co. and ECB calculations.  
 Note: The chart plots the relative contribution of the R-squared goodness of fit measures of the block-wise regressions of the five iTraxx tranche premia. The four blocks are credit risk (index and base correlation), interest rate factors (level and slope), risk aversion (JP Morgan index) and liquidity risk (swap spread, bid-ask, yen). The sample periods are August 2004 to July 2007 (“before”) and July 2007 to January 2008 (“after”).

case of the 6-9% tranche, credit risk accounted for more than 60% before the turmoil and for less than 40% after the start of the turmoil. Simultaneously, the contribution of risk aversion changed from less than 20% to more than 30%.

To analyse further how the individual explanatory power of risk aversion and liquidity risk changed over time, rolling bivariate correlations based on a moving window of 120 daily observations are estimated (see Charts C.4 and C.5).<sup>15</sup>

Across all tranches, there was a sharp increase in the linkages between risk aversion, liquidity risk and the tranche premia after summer 2007. In relative terms, the impact of risk aversion on tranche premia rose by more than the impact of liquidity risk on tranche premia. This difference between risk aversion and liquidity risk is observed for all tranches. Among the five tranches, the 12-22% tranche shows the strongest correlation with the bid-ask spread, and the

<sup>15</sup> Correlations are used because in a bivariate regression the R<sup>2</sup> measure equals the squared correlation coefficient.

**Chart C.4 Rolling correlations of iTraxx tranche premia and risk aversion measure**



Sources: JPMorgan Chase & Co. and ECB calculations.  
 Note: The chart plots the rolling bivariate correlations based on a moving window of 120 daily observations. The sample is January 2005 to January 2008.

**Chart C.5 Rolling correlations of iTraxx tranche premia and liquidity measure**



Sources: JPMorgan Chase & Co. and ECB calculations.  
 Note: The chart plots the rolling bivariate correlations based on a moving window of 120 daily observations. The sample is January 2005 to January 2008.

6-9% tranche has the strongest correlation with the risk aversion proxy. Furthermore, the impact of liquidity risk saw a slight decline in the last weeks of the sample period.

The two charts also show that the more recently observed relationships differ from those observed during the market turmoil in May 2005. In particular, the role of the risk aversion component exceeded that observed in 2005.

All in all, these findings imply that the declining risk appetite and heightened concerns about market liquidity which investors have shown since last summer have provided a sizeable contribution to the observed strong increase in tranche premia.

### CONCLUDING REMARKS

This special feature has analysed the determinants of the daily movement in CDS index tranche premia. By means of regression analysis the reaction of the market prices of iTraxx tranches to market-based variables such as proxies for credit risk, liquidity risk, risk aversion and interest rate risk were estimated.

The main finding is that the repricing of credit risk led to a heightened impact of risk aversion and liquidity measures on market prices. Hence, the strong increase in iTraxx tranche premia after the summer of 2007 can in part be explained by declining risk appetite and heightened aversion to liquidity risk of investors.

Overall, the results imply that even in the most liquid segment of the CDO market, market prices still contain a sizeable liquidity premium. This means that commonly used CDO pricing models do not capture a major determinant of market prices.



## GLOSSARY

**Adjustable-rate mortgage (ARM):** A mortgage with an interest rate that remains at a predetermined (usually favourable) level for an initial fixation period, but can thereafter be changed by the lender. While ARMs in many countries allow rate changes at the lender's discretion (also referred to as "discretionary ARMs"), rate changes for most ARMs in the United States are based on a pre-selected interest rate index over which the lender has no control.

**Alternative-A (Alt-A):** A mortgage risk category that falls between prime and sub-prime. The credit risk associated with Alt-A mortgage lending tends to be higher than that of prime mortgage lending on account of e.g. little or no borrower documentation (i.e. income and/or asset certainties) and/or a higher loan-to-value ratio, but lower than that of sub-prime mortgage lending due to a less (or non-)adverse credit history.

**Asset-backed commercial paper (ABCP):** A short-term debt instrument that is backed by a form of collateral provided by the issuer, which generally has a maturity of no more than 270 days and is either interest-bearing or discounted. The assets commonly used as collateral in the case of financing through ABCP conduits include trade receivables, consumer debt receivables and collateralised debt obligations.

**Asset-backed security (ABS):** A security that is collateralised by the cash flows from a pool of underlying assets, such as loans, leases, and receivables. Often, when the cash flows are collateralised by real estate, an ABS is called a mortgage-backed security.

**Basel II:** An accord providing a comprehensive revision of the Basel capital adequacy requirements issued by the Basel Committee on Banking Supervision (BCBS). Pillar I of the accord covers the minimum capital adequacy standards for banks, Pillar II focuses on enhancing the supervisory review process, and Pillar III encourages market discipline through increased disclosure of banks' financial conditions.

**Central bank credit (liquidity) facility:** A standing credit facility which can be drawn upon by certain designated account holders (e.g. banks) at a central bank. The facility can be used automatically at the initiative of the account holder. The loans typically take the form of either advances or overdrafts on an account holder's current account which may be secured by a pledge of securities or by repurchase agreements.

**Collateralised debt obligation (CDO):** A structured debt instrument backed by the performance of a portfolio of diversified securities, loans or credit default swaps, the securitised interests in which are divided into tranches with differing streams of redemption and interest payments. When the tranches are backed by securities or loans, the structured instrument is called a "cash" CDO. Where it is backed only by loans, it is referred to as a collateralised loan obligation (CLO) and when backed by credit default swaps, it is a "synthetic" CDO.

**Collateralised loan obligation (CLO):** A CDO backed by whole commercial loans, revolving credit facilities, or letters of credit.

**Combined ratio:** A financial ratio for insurers, which is calculated as the sum of the loss ratio and the expense ratio. Typically, a combined ratio of more than 100% indicates an underwriting loss for the insurer.

**Commercial mortgage-backed security (CMBS):** A security with cash flows generated by debt on property that focuses on commercial rather than residential property. Holders of such securities receive payments of interest and principal from the holders of the underlying commercial mortgage debt.

**Commercial paper:** Short-term obligations with maturities ranging from 2 to 270 days issued by banks, corporations and other borrowers. Such instruments are unsecured and usually discounted, although some are interest-bearing.

**Conduit:** A financial intermediary, such as a special-purpose vehicle (SPV) or a special investment vehicle (SIV), which funds the purchase of assets through the issuance of asset-backed securities such as commercial paper.

**Credit default swap (CDS):** A swap designed to transfer the credit exposure of fixed-income products between parties. The buyer of a credit default 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.

**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:** JPMorgan's Emerging Markets Bond Index Global (EMBI Global) spreads. The EMBI Global tracks US dollar-denominated debt instruments issued by emerging markets sovereign and quasi-sovereign entities, 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 maturities from one week to 12 months. It is 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 16:30 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 a fund's investments less liabilities. 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 of banks 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) account:** 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 based on currency options means that the volatility of calls is greater than

the volatility of similar puts, which implies that more market participants are betting on a sizeable 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 cumulative decline:** Triggers of total NAV or NAV-per-share cumulative decline represent contractual termination events which allow counterparties to terminate transactions and seize the collateral held.

**Value at risk (VaR):** A risk measure of a portfolio's maximum loss during a specific period of time at a given level of probability.

**Variation margin:** In margin deposit trading, these are the funds required to be deposited by an investor when a price movement has caused funds to fall below the initial margin requirement. Conversely, funds may be withdrawn by an investor when a price movement has caused funds to rise above the margin requirement.

**Write-down:** An adjustment to the value of loans recorded on the balance sheets of financial institutions. A loan is written down when it is recognised as having become partly unrecoverable, and its value on the balance sheet is reduced accordingly.

**Write-off:** An adjustment to the value of loans recorded on the balance sheets of financial institutions. A loan is written off when it is considered to be totally unrecoverable, and is removed from the balance sheet.

**Yield curve:** A curve describing the relationship between the interest rate or yield and the maturity at a given point in time for debt securities with the same credit risk but different maturity dates. The slope of the yield curve can be measured as the difference between the interest rates at two selected maturities.

# STATISTICAL ANNEX

## I EXTERNAL ENVIRONMENT

Chart S1:	US non-farm, non-financial corporate sector business liabilities	S5
Chart S2:	US non-farm, non-financial corporate sector business net equity issuance	S5
Chart S3:	US speculative-grade-rated corporations' default rates and forecast	S5
Chart S4:	US corporate sector rating changes	S5
Chart S5:	US household sector debt-to-disposable income ratio	S6
Chart S6:	US household sector debt burden	S6
Chart S7:	Share of adjustable-rate mortgages in the United States	S6
Chart S8:	US general government and federal debt-to-GDP ratio	S6
Chart S9:	International positions of all BIS reporting banks vis-à-vis emerging markets	S7
Table S1:	Financial vulnerability indicators for selected emerging market economies	S8
Table S2:	Value-at-risk (VaR) amounts by category of risk for global large and complex banking groups	S8
Chart S10:	Expected default frequencies (EDFs) for global large and complex banking groups	S9
Chart S11:	Distance-to-default for global large and complex banking groups	S9
Chart S12:	Equity prices for global large and complex banking groups	S9
Chart S13:	Credit default swap spreads for global large and complex banking groups	S9
Chart S14:	Global consolidated claims on non-banks in offshore financial centres	S10
Chart S15:	Global hedge fund net flows	S10
Chart S16:	Decomposition of the annual rate of growth of global hedge fund capital under management	S10
Chart S17:	Structure of global hedge fund capital under management	S10

## 2 INTERNATIONAL FINANCIAL MARKETS

Chart S18:	Global risk aversion indicator	S11
Chart S19:	Real broad USD effective exchange rate index	S11
Chart S20:	Selected nominal effective exchange rate indices	S11
Chart S21:	Selected bilateral exchange rates	S11
Chart S22:	Selected three-month implied foreign exchange market volatilities	S12
Chart S23:	Three-month money market rates in the United States and Japan	S12
Chart S24:	Government bond yields and term spreads in the United States and Japan	S12
Chart S25:	Net non-commercial positions in ten-year US Treasury futures	S12
Chart S26:	Stock prices in the United States	S13
Chart S27:	Implied volatility for the S&P 500 index	S13
Chart S28:	Risk reversal and strangle of the S&P 500 index	S13
Chart S29:	Price-earnings (P/E) ratio for the US stock market	S13
Chart S30:	US mutual fund flows	S14
Chart S31:	Debit balances in New York Stock Exchange margin accounts	S14
Chart S32:	Open interest in options contracts on the S&P 500 index	S14
Chart S33:	Gross equity issuance in the United States	S14
Chart S34:	US investment-grade corporate bond spreads	S15
Chart S35:	US speculative-grade corporate bond spreads	S15
Chart S36:	US credit default swap indices	S15
Chart S37:	Emerging market sovereign bond spreads	S15
Chart S38:	Emerging market local currency sovereign bond yields	S16
Chart S39:	Emerging market stock price indices	S16
Table S3:	Total international bond issuance (private and public) in selected emerging markets	S16

Chart S40: Oil price and oil futures prices	S17
Chart S41: Crude oil futures contracts	S17
Chart S42: Precious metals prices	S17

### 3 EURO AREA ENVIRONMENT

Chart S43: Real GDP growth in the euro area	S18
Chart S44: Survey-based estimates of the four-quarter-ahead downside risk of weak real GDP growth in the euro area	S18
Chart S45: Unemployment rate in the euroarea and in selected euro area countries	S18
Chart S46: Gross fixed capital formation in the euro area	S18
Chart S47: Annual growth in MFI loans to non-financial corporations in the euro area for selected maturities	S19
Chart S48: Annual growth in debt securities issued by non-financial corporations in the euro area	S19
Chart S49: Real cost of external financing of euro area non-financial corporations	S19
Chart S50: Net lending/borrowing of non-financial corporations in the euro area	S19
Chart S51: Total debt of non-financial corporations in the euro area	S20
Chart S52: Total debt-to-financial assets ratio of non-financial corporations in the euro area	S20
Chart S53: Euro area and European speculative-grade-rated corporations' default rates and forecast	S20
Chart S54: Euro area non-financial corporations' rating changes	S20
Chart S55: Expected default frequency (EDF) of euro area non-financial corporations	S21
Chart S56: Expected default frequency (EDF) distributions for non-financial corporations	S21
Chart S57: Expected default frequency (EDF) distributions for large euro area non-financial corporations	S21
Chart S58: Expected default frequency (EDF) distributions for small euro area non-financial corporations	S21
Chart S59: Euro area country distributions of commercial property price changes	S22
Chart S60: Euro area commercial property price changes in different sectors	S22
Chart S61: Annual growth in MFI loans to households in the euro area	S22
Chart S62: Household debt-to-disposable income ratios in the euro area	S22
Chart S63: Household debt-to-GDP ratio in the euro area	S23
Chart S64: Household debt-to-assets ratios in the euro area	S23
Chart S65: Total debt servicing burden of the euro area household sector	S23
Chart S66: Residential investment in the euro area	S23
Chart S67: Residential property price changes in the euro area	S24
Chart S68: House price-to-rent ratio for the euro area and selected euro area countries	S24
Table S4: Residential property price changes in euro area countries	S24

### 4 EURO AREA FINANCIAL MARKETS

Chart S69: Bid-ask spreads for EONIA swap rates	S25
Chart S70: Euro area spreads between unsecured interbank deposit and repo interest rates	S25
Chart S71: Implied volatility of three-month EURIBOR futures	S25
Chart S72: Monthly gross issuance of short-term securities (other than shares) by euro area non-financial corporations	S25
Chart S73: Euro area government bond yields and term spread	S26
Chart S74: Option-implied skewness coefficient for ten-year bond yields in Germany	S26
Chart S75: Stock prices in the euro area	S26
Chart S76: Implied volatility for the Dow Jones EURO STOXX 50 index	S26

Chart S77: Risk reversal and strangle of the Dow Jones EURO STOXX 50 index	S27
Chart S78: Price-earnings (P/E) ratio for the euro area stock market	S27
Chart S79: Open interest in options contracts on the Dow Jones EURO STOXX 50 index	S27
Chart S80: Gross equity issuance and pipeline deals in the euro area	S27
Chart S81: Investment-grade corporate bond spreads in the euro area	S28
Chart S82: Speculative-grade corporate bond spreads in the euro area	S28
Chart S83: iTraxx Europe five-year credit default swap indices	S28
Chart S84: Term structures of premiums for iTraxx Europe and HiVol	S28
Chart S85: iTraxx sector indices	S29

## 5 EURO AREA FINANCIAL INSTITUTIONS

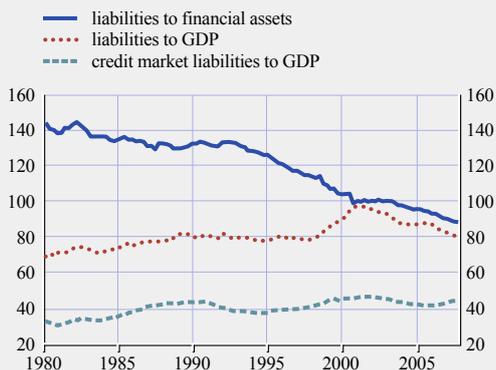
Table S5: Financial conditions of large and complex banking groups in the euro area	S30
Chart S86: Frequency distribution of return on equity (ROE) for large and complex banking groups in the euro area	S31
Chart S87: Frequency distribution of return on risk-weighted assets for large and complex banking groups in the euro area	S31
Chart S88: Frequency distribution of net interest income for large and complex banking groups in the euro area	S31
Chart S89: Frequency distribution of net loan impairment charges for large and complex banking groups in the euro area	S31
Chart S90: Frequency distribution of cost-to-income ratios for large and complex banking groups in the euro area	S32
Chart S91: Frequency distribution of Tier 1 ratios for large and complex banking groups in the euro area	S32
Chart S92: Frequency distribution of overall solvency ratios for large and complex banking groups in the euro area	S32
Chart S93: Annual growth in euro area MFI loans extended by sector	S32
Chart S94: Lending margins of euro area MFIs	S33
Chart S95: Euro area MFI loan spreads	S33
Chart S96: Write-off rates on euro area MFI loans	S33
Chart S97: Annual growth in euro area MFI securities and shares issuance	S33
Chart S98: Deposit margins of euro area MFIs	S34
Chart S99: Euro area MFI foreign currency-denominated assets, selected balance sheet items	S34
Chart S100: International exposure of euro area banks to Latin American countries	S34
Chart S101: International exposure of euro area banks to Asian countries	S34
Table S6: Euro area consolidated foreign claims of reporting banks on individual countries	S35
Chart S102: Euro area banks' credit standards applied to loans and credit lines to enterprises and contributing factors	S36
Chart S103: Euro area banks' credit standards applied to loans and credit lines to enterprises and terms and conditions	S36
Chart S104: Euro area banks' credit standards applied to loans to households for house purchase and contributing factors	S36
Chart S105: Euro area banks' credit standards applied to consumer credit loans to households and contributing factors	S36
Chart S106: Expected default frequencies (EDFs) for large and complex banking groups in the euro area	S37
Chart S107: Distance-to-default for large and complex banking groups in the euro area	S37

Chart S108: European financial institutions' and euro area large and complex banking groups' credit default swap spreads	S37
Chart S109: Earnings and earnings forecasts for large and complex banking groups in the euro area	S37
Chart S110: Dow Jones EURO STOXX total market and bank indices	S38
Chart S111: Implied volatility for Dow Jones EURO STOXX total market and bank indices	S38
Chart S112: Risk reversal and strangle of the Dow Jones EURO STOXX bank index	S38
Chart S113: Price-earnings (P/E) ratios for large and complex banking groups in the euro area	S38
Chart S114: Rating actions for large and complex banking groups in the euro area	S39
Chart S115: Distribution of ratings for large and complex banking groups in the euro area	S39
Table S7: Rating averages and outlooks for large and complex banking groups in the euro area	S39
Chart S116: Value of mergers and acquisitions by euro area banks	S40
Chart S117: Number of mergers and acquisitions by euro area banks	S40
Chart S118: Distribution of gross-premium-written growth for a sample of large euro area insurers	S40
Chart S119: Distribution of loss, expense and combined ratios in non-life business for a sample of large euro area insurers	S40
Chart S120: Distribution of income, profitability and solvency for a sample of large euro area insurers	S41
Chart S121: Distribution of gross-premium-written growth for a sample of large euro area reinsurers	S41
Chart S122: Distribution of loss, expense and combined ratios for a sample of large euro area reinsurers	S41
Chart S123: Distribution of income, profitability and solvency for a sample of large euro area reinsurers	S41
Chart S124: Distribution of equity asset shares of euro area insurers	S42
Chart S125: Distribution of bond asset shares of euro area insurers	S42
Chart S126: Expected default frequencies (EDFs) for the euro area insurance sector	S42
Chart S127: Subordinated bond asset swap spread for the euro area insurance sector	S42
Chart S128: Dow Jones EURO STOXX total market and insurance indices	S43
Chart S129: Implied volatility for Dow Jones EURO STOXX total market and insurance indices	S43
Chart S130: Risk reversal and strangle of the Dow Jones EURO STOXX insurance index	S43
Chart S131: Price-earnings (P/E) ratios for euro area insurers	S43
<b>6 EURO AREA FINANCIAL SYSTEM INFRASTRUCTURES</b>	
Chart S132: Large-value payments processed via TARGET	S44
Chart S133: Large-value payments processed via TARGET, by country	S44
Chart S134: TARGET availability	S44
Chart S135: Volumes and values of foreign exchange trades settled via Continuous Linked Settlement (CLS)	S44

# I EXTERNAL ENVIRONMENT

**Chart S1 US non-farm, non-financial corporate sector business liabilities**

(Q1 1980 – Q4 2007; %)



Sources: US Federal Reserve Board and Bureau of Economic Analysis.

**Chart S2 US non-farm, non-financial corporate sector business net equity issuance**

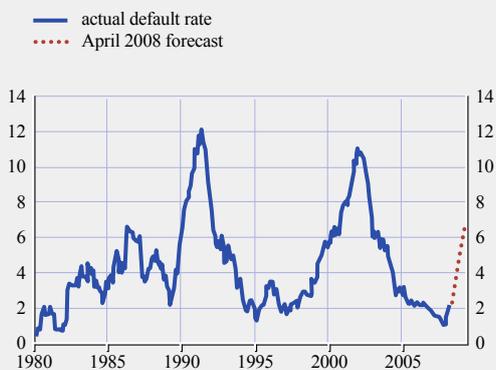
(Q1 1980 – Q4 2007; USD billions; seasonally adjusted quarterly annualised data)



Source: US Federal Reserve Board.

**Chart S3 US speculative-grade-rated corporations' default rates and forecast**

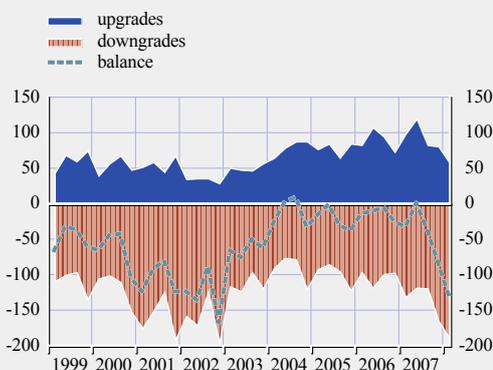
(Jan. 1980 – Apr. 2009; %; 12-month trailing sum)



Source: Moody's.

**Chart S4 US corporate sector rating changes**

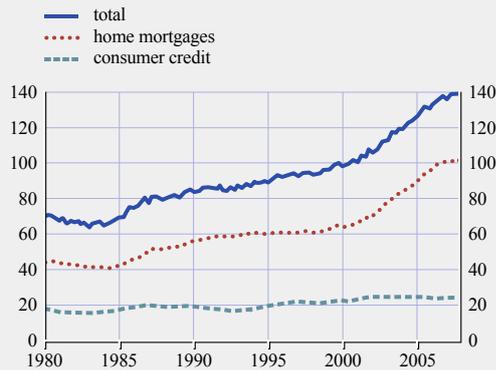
(Q1 1999 – Q1 2008; number)



Source: Moody's.

**Chart S5 US household sector debt-to-disposable income ratio**

(Q1 1980 – Q4 2007; % of disposable income)



Source: US Federal Reserve Board.

**Chart S6 US household sector debt burden**

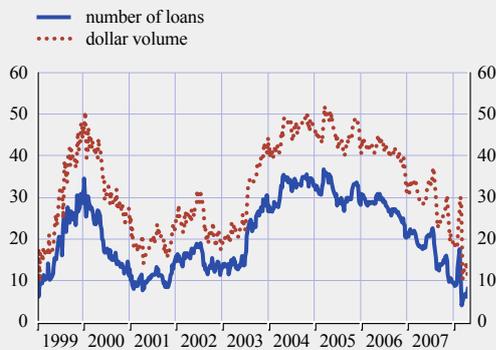
(Q1 1980 – Q4 2007; % of disposable income)



Source: US Federal Reserve Board.

**Chart S7 Share of adjustable-rate mortgages in the United States**

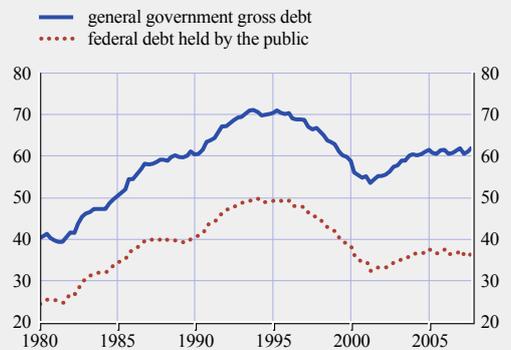
(Jan. 1999 – May 2008; % of total new mortgages)



Source: Mortgage Bankers Association.

**Chart S8 US general government and federal debt-to-GDP ratio**

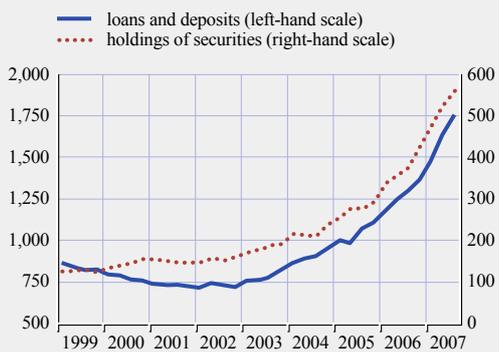
(Q1 1980 – Q4 2007; % of GDP)



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 2007; 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)		
	2006	2007 (e)	2008 (f)	2006	2007 (e)	2008 (f)	2006	2007 (e)	2008 (f)	2006	2007 (e)	2008 (f)
<b>Latin America</b>												
Argentina	3.7	2.6	1.8	50	43	38	45	32	28	7.2	8.5	9.0
Brazil	1.3	0.3	-0.7	19	19	17	24	24	27	6.7	11.0	12.8
Chile	3.6	4.4	2.7	33	29	26	38	46	48	3.4	2.7	2.7
Colombia	-2.3	-3.2	-3.5	29	24	23	35	25	23	4.9	5.8	6.1
Mexico	-0.2	-0.9	-1.0	20	19	18	45	42	41	3.1	3.1	2.9
Venezuela	15.0	7.4	5.2	24	23	19	33	45	47	7.9	4.3	3.5
<b>Asia</b>												
China	9.4	11.6	9.9	12	11	9	16	12	10	14.4	16.9	17.7
India	-1.1	-1.2	-1.0	20	20	18	11	9	8	9.1	11.1	10.9
Indonesia	2.7	2.5	2.2	35	33	30	62	55	44	4.3	5.2	5.8
Malaysia	8.5	6.5	-	33	31	-	10	11	-	6.0	6.0	-
South Korea	0.3	0.1	-	24	23	-	38	40	-	7.0	6.5	-
Thailand	1.1	6.1	3.1	28	22	18	32	21	18	5.0	5.9	6.6
<b>Emerging Europe</b>												
Russia	9.6	6.1	1.2	29	31	28	26	22	20	13.4	14.5	12.8
Turkey	-7.8	-7.0	-7.5	55	52	49	114	113	120	4.8	4.6	4.4

Source: Institute of International Finance.  
Note: Data for 2007 are estimates and data for 2008 are forecasts.

**Table S2 Value-at-risk (VaR) amounts by category of risk for global large and complex banking groups**

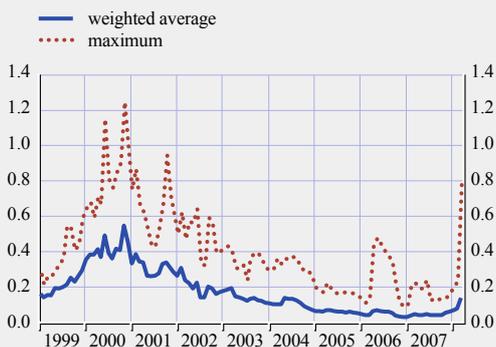
(USD millions; 99% confidence; ten-day holding period)

	Commodities	Equities	Interest rate	Foreign exchange
2006 average	56.5	103.4	166.9	46.3
2006 median	39.2	121.1	150.5	48.1
2007 average	65.0	141.0	252.5	58.0
2007 median	57.0	144.7	269.1	72.7

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. 2008; % probability)



Sources: Moody's KMV and ECB calculations.  
Note: 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. 2008)



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**

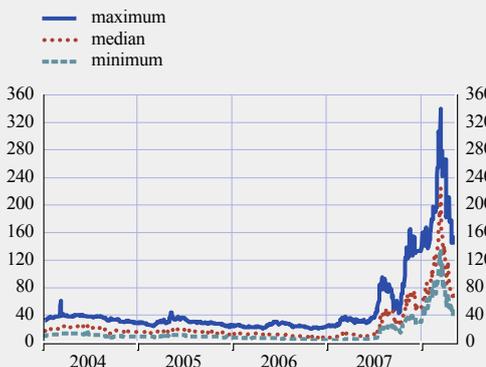
(Jan. 2004 – May 2008; index: Jan. 2004 = 100)



Sources: Bloomberg and ECB calculations.

**Chart S13 Credit default swap spreads for global large and complex banking groups**

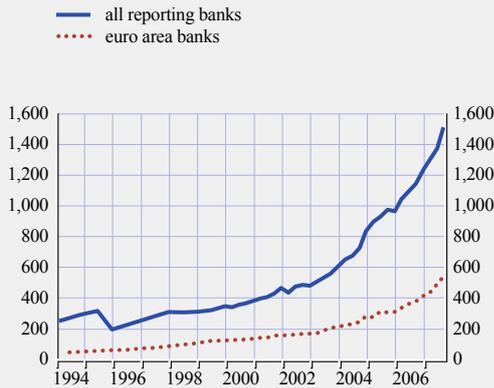
(Jan. 2004 – May 2008; basis points; senior debt, five-year maturity)



Sources: Bloomberg and ECB calculations.

**Chart S14 Global consolidated claims on non-banks in offshore financial centres**

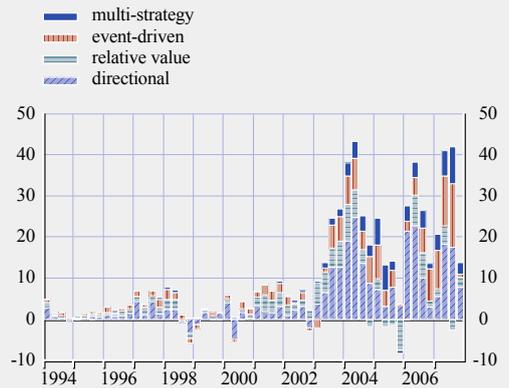
(Q1 1994 – Q3 2007; USD billions)



Source: BIS.

**Chart S15 Global hedge fund net flows**

(Q1 1994 – Q4 2007; USD billions)

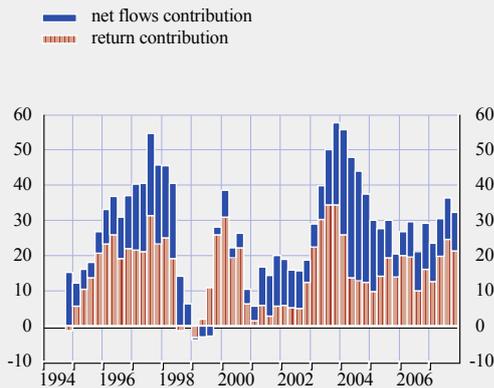


Source: Lipper TASS.

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**

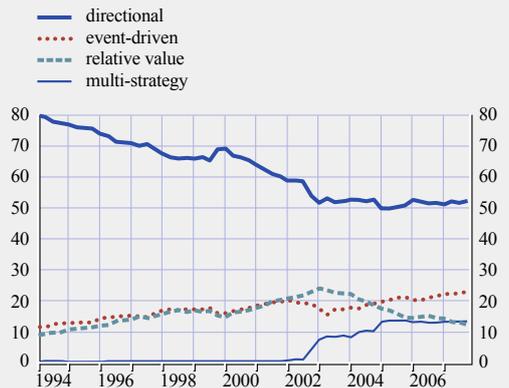
(Q4 1994 – Q4 2007; %; 12-month changes)



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 1.4 trillion at the end of December 2007.

**Chart S17 Structure of global hedge fund capital under management**

(Q1 1994 – Q4 2007; %)

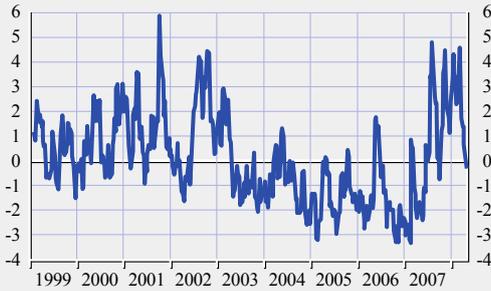


Sources: Lipper TASS and ECB calculations.  
Note: Excluding funds of hedge funds. The directional group includes long/short equity hedge, global macro, emerging markets, dedicated short-bias and managed futures strategies. The relative value group consists of convertible arbitrage, fixed-income arbitrage and equity market-neutral strategies.

## 2 INTERNATIONAL FINANCIAL MARKETS

Chart S18 Global risk aversion indicator

(Jan. 1999 – May 2008)



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 (2007), "Measuring investors' risk appetite", *Financial Stability Review*, June.

Chart S19 Real broad USD effective exchange rate index

(Jan. 1999 – Apr. 2008; index: Jan. 1999 = 100)



Source: US Federal Reserve Board.

Chart S20 Selected nominal effective exchange rate indices

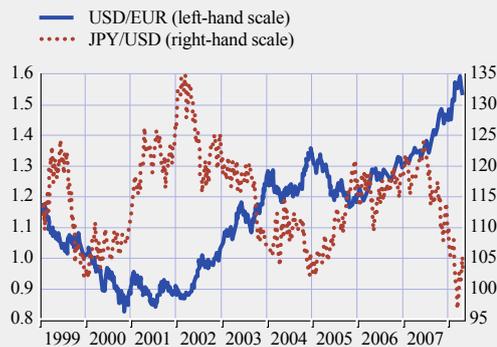
(Jan. 1999 – May 2008; index: Jan. 1999 = 100)



Sources: US Federal Reserve Board and ECB.

Chart S21 Selected bilateral exchange rates

(Jan. 1999 – May 2008)

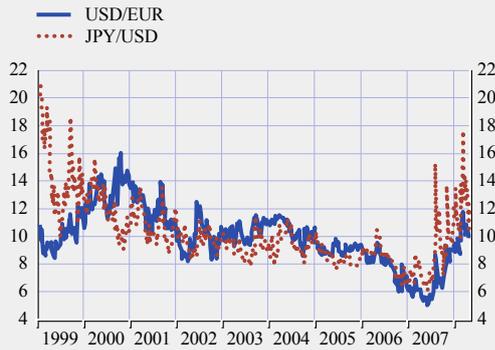


Source: ECB.



**Chart S22 Selected three-month implied foreign exchange market volatilities**

(Jan. 1999 – May 2008; %)



Source: Bloomberg.

**Chart S23 Three-month money market rates in the United States and Japan**

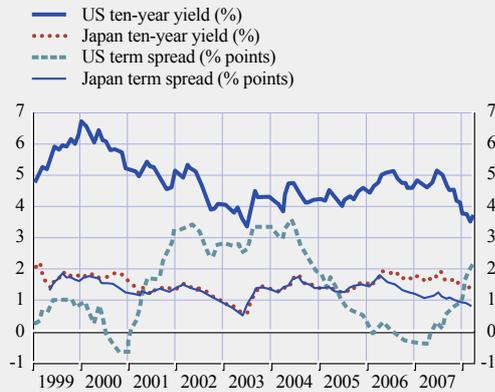
(Jan. 1999 – May 2008; LIBOR, %)



Source: Bloomberg.

**Chart S24 Government bond yields and term spreads in the United States and Japan**

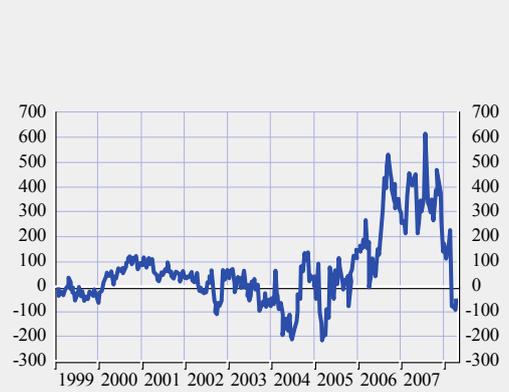
(Jan. 1999 – Apr. 2008)



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 S25 Net non-commercial positions in ten-year US Treasury futures**

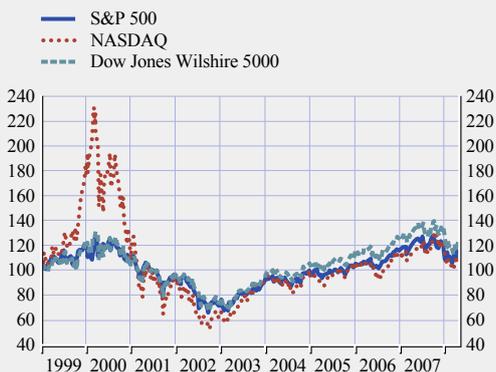
(Jan. 1999 – Apr. 2008; thousands of contracts)



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**

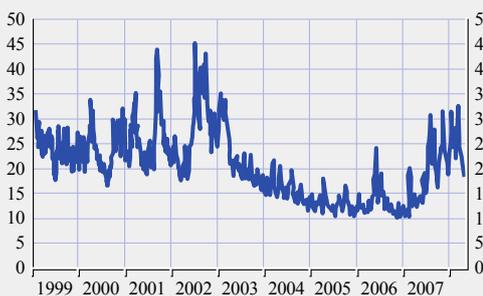
(Jan. 1999 – May 2008; index: Jan. 1999 = 100)



Source: Bloomberg.

**Chart S27 Implied volatility for the S&P 500 index**

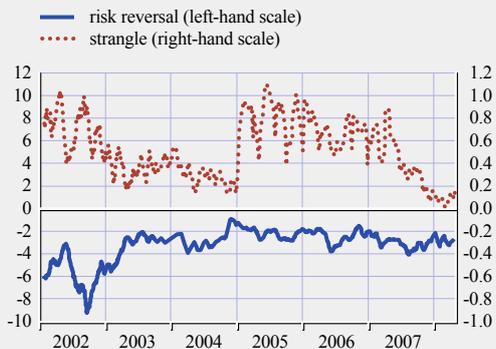
(Jan. 1999 – May 2008; %; CBOE Volatility Index (VIX))



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 2008; %; 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**

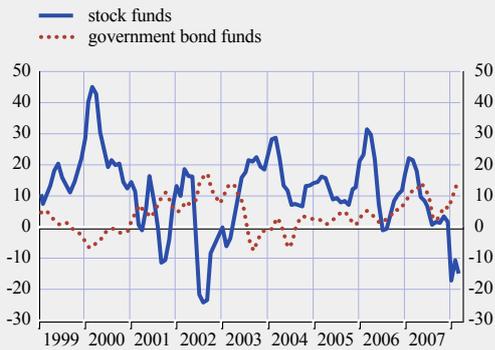
(Jan. 1985 – May 2008; %; ten-year trailing earnings)



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 – Mar. 2008; USD billions; three-month moving average)



Source: Investment Company Institute.

### Chart S31 Debit balances in New York Stock Exchange margin accounts

(Jan. 1999 – Mar. 2008; 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

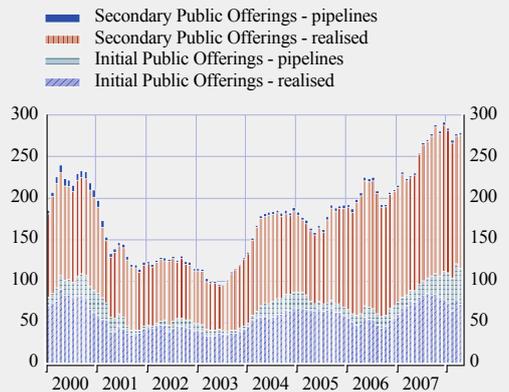
(Jan. 1999 – Apr. 2008; millions of contracts)



Source: Chicago Board Options Exchange (CBOE).

### Chart S33 Gross equity issuance in the United States

(Jan. 2000 – Apr. 2008; USD billions; 12-month moving sums)



Source: Thomson Financial Datastream.

**Chart S34 US investment-grade corporate bond spreads**

(Jan. 2000 – May 2008; 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**

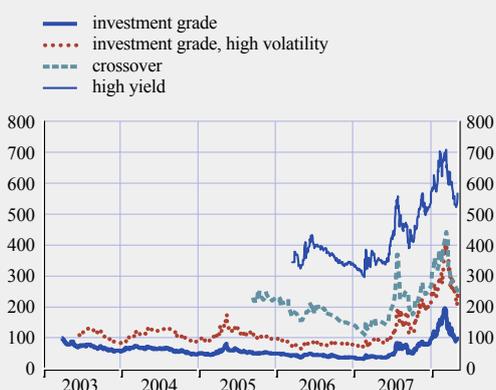
(Jan. 1999 – May 2008; basis points)



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**

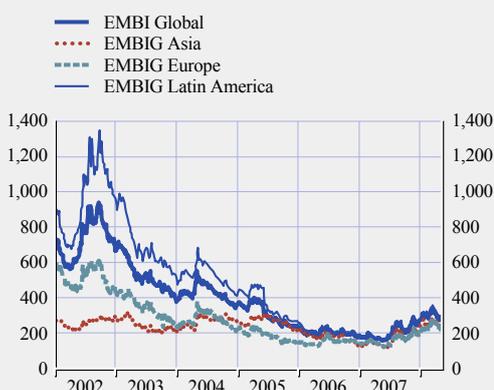
(Apr. 2003 – May 2008; basis points; five-year maturity)



Source: JPMorgan Chase & Co.

**Chart S37 Emerging market sovereign bond spreads**

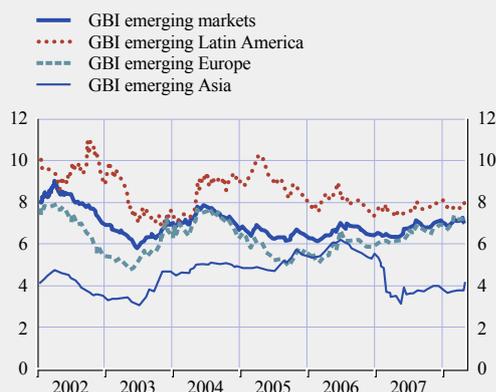
(Jan. 2002 – May 2008; basis points)



Source: JPMorgan Chase & Co.

**Chart S38 Emerging market local currency sovereign bond yields**

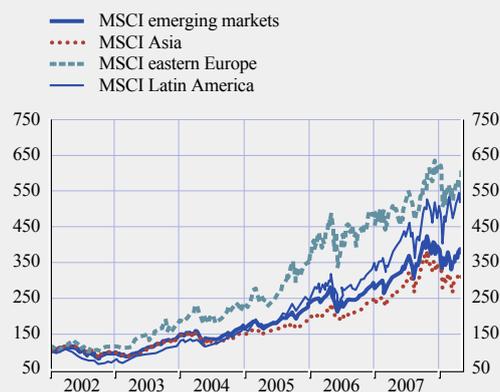
(Jan. 2002 – May 2008; %)



Source: JPMorgan Chase & Co.  
Note: GBI stands for Government Bond Index.

**Chart S39 Emerging market stock price indices**

(Jan. 2002 – May 2008; 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 Q1
<b>Asia</b>	<b>24,722</b>	<b>37,169</b>	<b>41,822</b>	<b>50,592</b>	<b>44,302</b>	<b>68,582</b>	<b>10,150</b>
<i>of which</i>							
South Korea	9,091	9,714	15,202	15,884	15,352	22,404	3,268
Hong Kong	1,013	11,980	4,244	5,398	4,409	5,937	238
Singapore	378	3,307	4,861	4,755	3,641	4,772	320
India	-	300	2,928	2,596	2,377	8,405	158
China	750	2,295	4,451	3,545	2,080	2,267	-
Malaysia	4,815	884	2,375	2,733	2,547	300	-
Thailand	-	300	1,400	1,800	1,425	761	-
<b>Latin America</b>	<b>17,393</b>	<b>30,394</b>	<b>31,264</b>	<b>33,690</b>	<b>33,310</b>	<b>49,783</b>	<b>5,234</b>
<i>of which</i>							
Brazil	5,736	10,470	9,426	13,264	17,180	13,168	2,392
Mexico	5,598	11,226	11,279	6,853	5,288	12,307	1,500
Venezuela	-	3,670	4,000	5,929	100	10,078	245
Colombia	500	1,265	1,544	2,097	3,177	3,128	-
Chile	1,399	1,000	1,307	-	1,328	250	-
Argentina	-	-	-	300	1,463	3,623	-
<b>Emerging Europe</b>	<b>821,207</b>	<b>1,258,292</b>	<b>1,452,101</b>	<b>1,704,834</b>	<b>2,031,303</b>	<b>2,074,900</b>	<b>430,870</b>
<i>of which</i>							
Russian Federation	3,363	8,585	16,567	17,299	25,181	35,526	528
Ukraine	399	1,250	2,058	1,808	2,765	4,169	-
Croatia	647	541	1,098	-	383	742	-

Source: Dealogic (DCM Analytics).

Note: Regions are defined as follows Latin America: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela. Asia: Brunei, Burma, China, Special Administrative Region of Hong Kong, 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.

Chart S40 Oil price and oil futures prices

(Jan. 1999 – Apr. 2009; USD per barrel)



Source: Bloomberg.

Chart S41 Crude oil futures contracts

(Jan. 1999 – Apr. 2008; 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 2008; index: Jan. 1999 = 100)

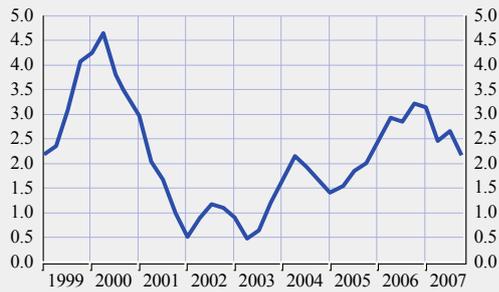


Source: Bloomberg.  
Note: The indices are based on prices in USD.

### 3 EURO AREA ENVIRONMENT

**Chart S43 Real GDP growth in the euro area**

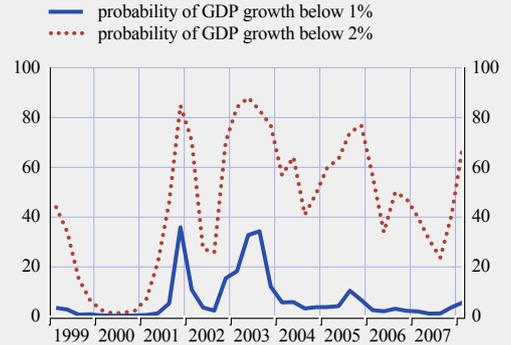
(Q1 1999 – Q4 2007; % per annum)



Source: Eurostat.

**Chart S44 Survey-based estimates of the four-quarter-ahead downside risk of weak real GDP growth in the euro area**

(Q1 1999 – Q1 2008; %)

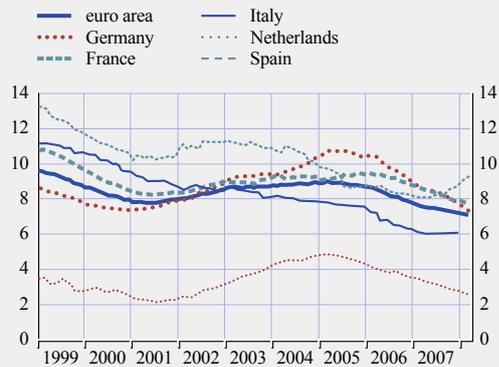


Sources: ECB Survey of Professional Forecasters (SPF) and ECB calculations.

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. 2008; %)



Source: Eurostat.

**Chart S46 Gross fixed capital formation in the euro area**

(Q1 1999 – Q4 2007; % of GDP)



Source: Eurostat.

**Chart S47 Annual growth in MFI loans to non-financial corporations in the euro area for selected maturities**

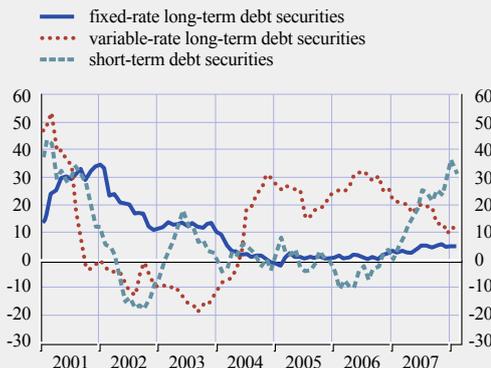
(Q1 1999 – Q1 2008; % per annum)



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**

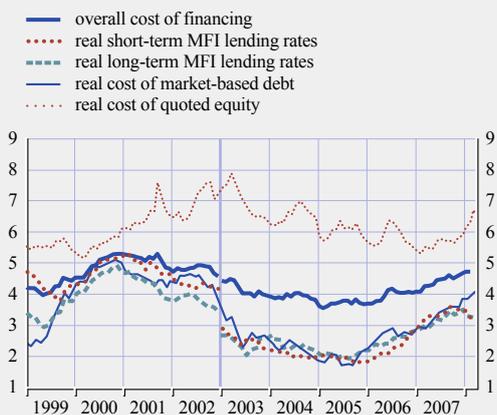
(Jan. 2001 – Feb. 2008; % per annum; outstanding amounts)



Source: ECB.

**Chart S49 Real cost of external financing of euro area non-financial corporations**

(Jan. 1999 – Mar. 2008; %)



Sources: ECB, Thomson Financial Datastream, Merrill Lynch, Consensus Economics Forecast and ECB calculations.  
Note: The real cost of external financing is calculated as a 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**

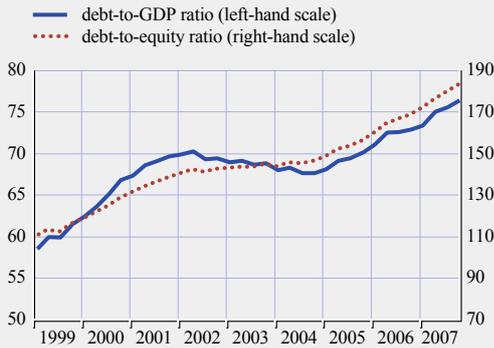
(Q1 2000 – Q4 2007; % of gross value added of non-financial corporations; four-quarter moving sum)



Sources: ECB and ECB calculations.

**Chart S51 Total debt of non-financial corporations in the euro area**

(Q1 1999 – Q4 2007; %)



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 Total debt-to-financial assets ratio of non-financial corporations in the euro area**

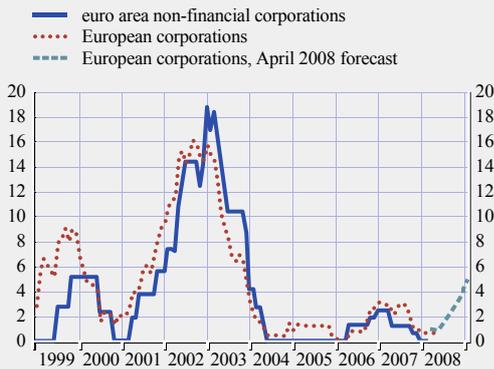
(Q1 1999 – Q4 2007; %)



Source: ECB.

**Chart S53 Euro area and European speculative-grade-rated corporations' default rates and forecast**

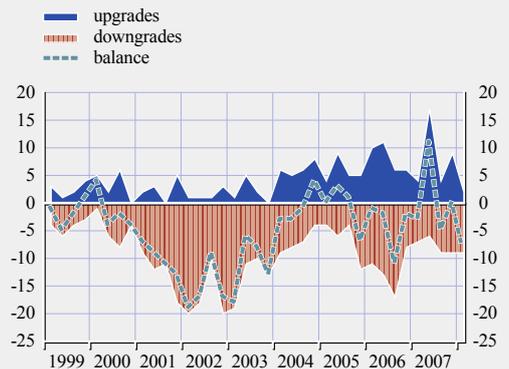
(Jan. 1999 – Apr. 2009; %; 12-month trailing sum)



Source: Moody's.

**Chart S54 Euro area non-financial corporations' rating changes**

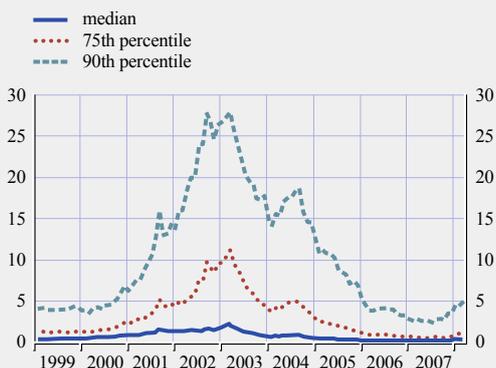
(Q1 1999 – Q1 2008; number)



Source: Moody's.

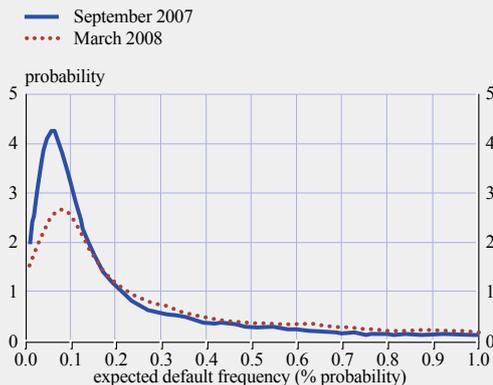
**Chart S55 Expected default frequency (EDF) of euro area non-financial corporations**

(Jan. 1999 – Mar. 2008; % probability)



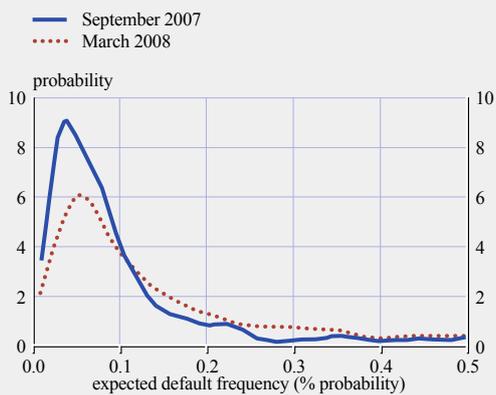
Sources: Moody's KMV and ECB calculations.  
Note: The EDF provides an estimate of the probability of default over the following year. Due to measurement considerations, the EDF values are restricted by Moody's KMV to the interval between 0.01% and 35%.

**Chart S56 Expected default frequency (EDF) distributions for non-financial corporations**



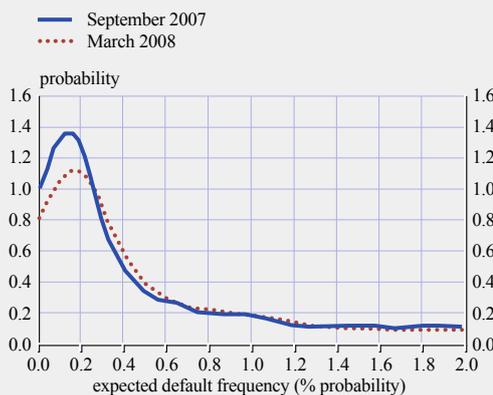
Sources: Moody's KMV and ECB calculations.  
Note: The EDF provides an estimate of the probability of default over the following year.

**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.

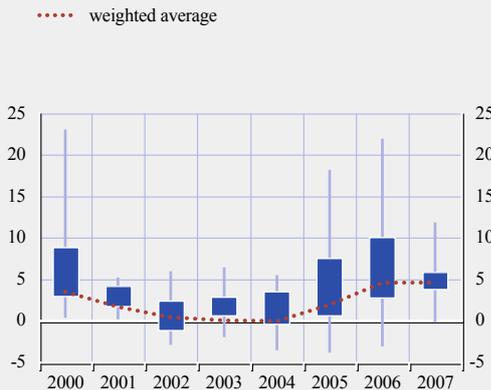
**Chart S58 Expected default frequency (EDF) distributions for small euro area non-financial corporations**



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 price changes**

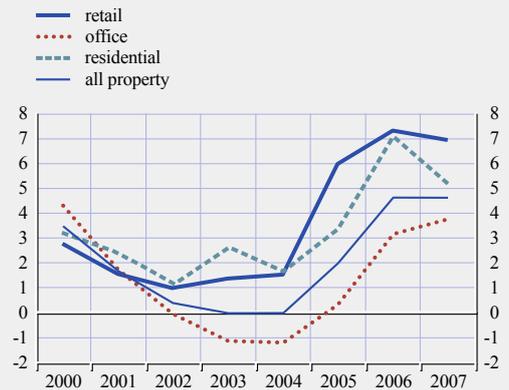
(2000 – 2007; capital values; % change per annum; minimum, maximum and interquartile distribution of country-level data)



Sources: Investment Property Databank, 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%.

**Chart S60 Euro area commercial property price changes in different sectors**

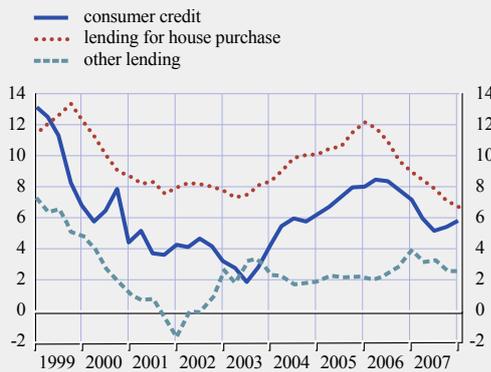
(2000 – 2007; capital values; % change per annum)



Sources: Investment Property Databank, 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%.

**Chart S61 Annual growth in MFI loans to households in the euro area**

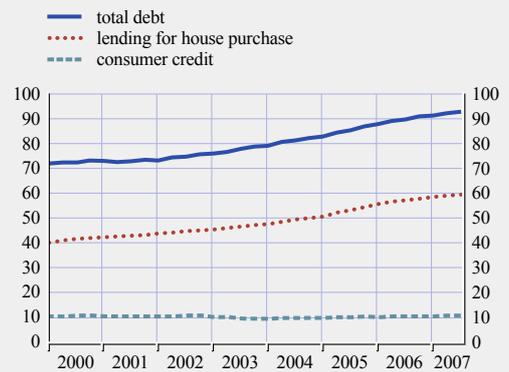
(Q1 1999 – Q1 2008; % change per annum)



Source: ECB.  
Note: Data are based on financial transactions of MFI loans.

**Chart S62 Household debt-to-disposable income ratios in the euro area**

(Q4 1999 – Q4 2007; % 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**

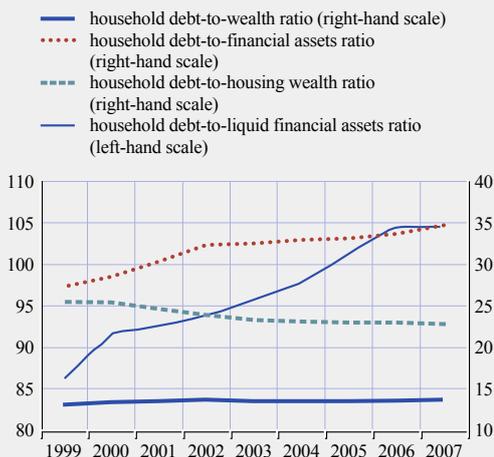
(Q1 1999 – Q4 2007; %)



Sources: ECB and Eurostat.

**Chart S64 Household debt-to-assets ratios in the euro area**

(1999 – 2007; %)



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 Total debt servicing burden of the euro area household sector**

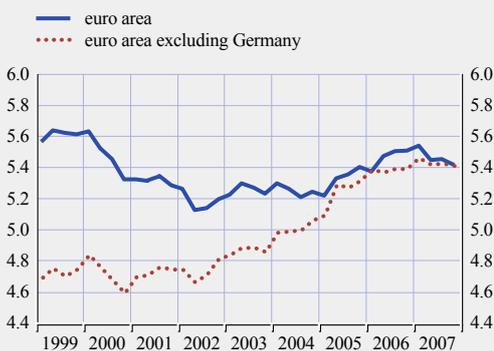
(Q1 2000 – Q4 2007; % of disposable income)



Sources: ECB and ECB calculations.

**Chart S66 Residential investment in the euro area**

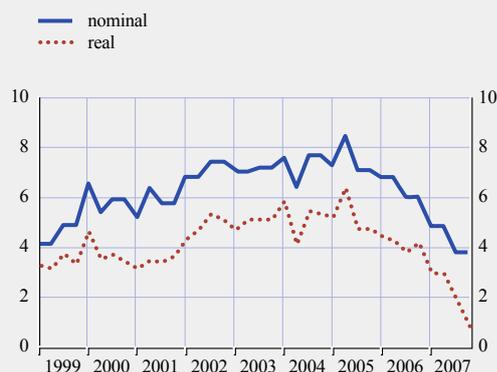
(Q1 1999 – Q4 2007; % of GDP)



Sources: ECB, Eurostat and ECB calculations.

**Chart S67 Residential property price changes in the euro area**

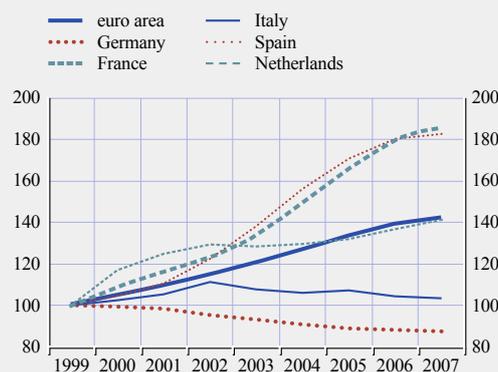
(Q1 1999 – Q4 2007; % change per annum)



Sources: National sources and ECB calculations.  
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 – 2007; index: 1999 = 100)



Source: ECB.

**Table S4 Residential property price changes in euro area countries**

(% change per annum)

	2001	2002	2003	2004	2005	2006	2007	2006		2007		2007			
								H1	H2	H1	H2	Q1	Q2	Q3	Q4
Belgium <sup>1)</sup>	6.2	7.8	7.1	12.0	16.7	11.1	9.2	12.4	9.9	9.3	9.1	9.1	9.4	10.3	7.9
Austria <sup>2)</sup>	2.2	0.2	0.3	-2.2	5.1	4.0	..	4.1	4.0	3.9	..	3.5	4.4	4.8	..
Cyprus	..	..	8.0	20.0	12.0	10.0	15.0	..	..	..	..	..	..	..	..
Finland <sup>1)</sup>	-0.5	7.4	6.3	7.3	6.1	7.4	6.0	8.3	6.6	6.4	5.6	6.4	6.4	5.9	5.3
France <sup>1)</sup>	7.9	8.3	11.7	15.2	15.3	12.1	6.6	13.9	10.5	7.5	5.7	8.1	6.8	5.7	5.7
Germany <sup>2)</sup>	0.2	-1.9	-1.2	-1.4	-1.5	0.3	0.3	..	..	..	..	..	..	..	..
Greece <sup>2)</sup>	14.4	13.9	5.4	2.3	10.9	12.2	..	13.0	11.4	..	..	..	..	..	..
Ireland <sup>2)</sup>	14.0	6.1	14.3	11.5	7.2	13.4	0.9	12.7	14.1	6.0	-3.9	9.2	2.9	-1.8	-6.0
Italy <sup>2)</sup>	7.4	13.7	10.6	9.2	9.6	6.7	5.7	6.4	7.0	6.6	4.8	..	..	..	..
Luxembourg <sup>2)</sup>	11.4	10.8	11.5	14.0	11.7	..	..	..	..	..	..	..	..	..	..
Malta <sup>2)</sup>	5.0	8.7	13.3	20.3	9.8	3.5	1.1	5.8	1.4	1.6	0.6	3.1	0.2	1.1	0.1
Netherlands <sup>1)</sup>	11.2	8.4	4.8	4.1	4.7	4.5	..	4.8	4.3	4.5	..	4.6	4.3	4.9	..
Portugal <sup>2)</sup>	5.4	0.6	1.1	0.6	2.3	2.1	1.3	3.4	0.8	1.2	1.5	1.3	1.1	1.3	1.7
Spain <sup>2)</sup>	9.9	15.7	17.6	17.4	13.9	10.4	5.8	11.4	9.5	6.5	5.1	7.2	5.8	5.3	4.8
euro area	5.8	7.1	7.1	7.5	7.8	6.5	4.5	7.0	6.1	5.0	4.0	..	..	..	..

Sources: National sources and ECB calculations.

Note: Weights are based on 2006 nominal GDP. The estimate of the euro area aggregate for the first half of 2007 is based on the interpolation of confidential annual data for Germany. Data for Slovenia are confidential.

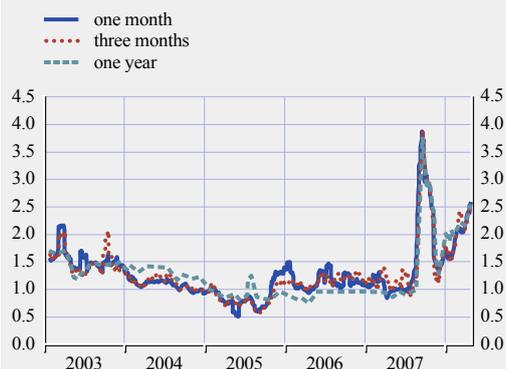
1) Existing dwellings (houses and flats); whole country.

2) All dwellings (new and existing houses and flats); whole country.

## 4 EURO AREA FINANCIAL MARKETS

**Chart S69 Bid-ask spreads for EONIA swap rates**

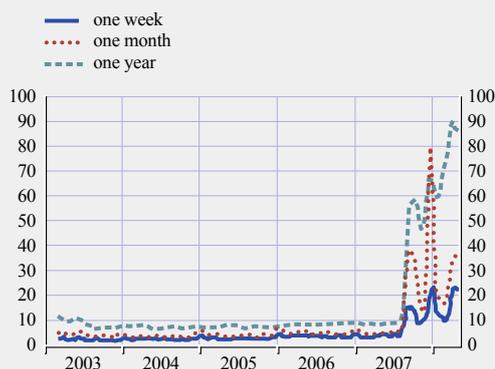
(Jan. 2003 – Apr. 2008; basis points; 20-day moving average; transaction-weighted)



Source: e-MID.

**Chart S70 Euro area spreads between unsecured interbank deposit and repo interest rates**

(Mar. 2003 – May 2008; basis points; 20-day moving average)



Source: ECB.

**Chart S71 Implied volatility of three-month EURIBOR futures**

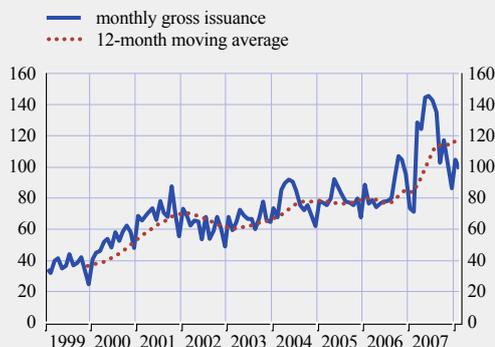
(Apr. 1999 – May 2008; %; 60-day moving average)



Source: Bloomberg.

**Chart S72 Monthly gross issuance of short-term securities (other than shares) by euro area non-financial corporations**

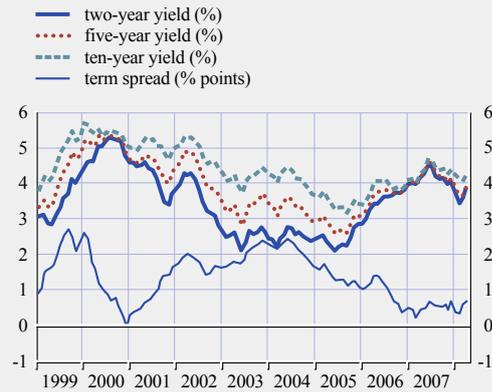
(Jan. 1999 – Feb. 2008; € billions; maturities up to one year)



Source: ECB.

### Chart S73 Euro area government bond yields and term spread

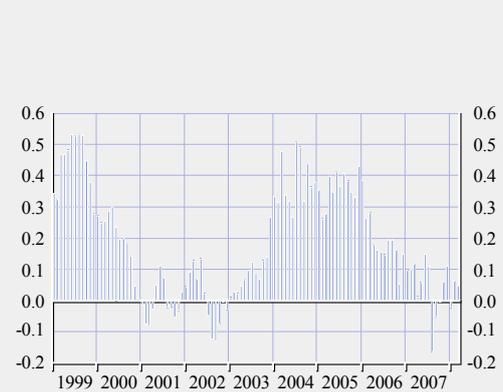
(Jan. 1999 – Apr. 2008)



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 skewness coefficient for ten-year bond yields in Germany

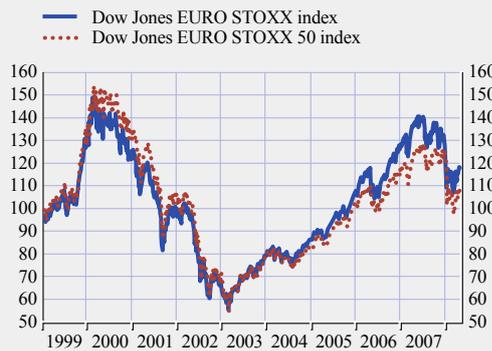
(Jan. 1999 – Mar. 2008; average monthly skewness)



Sources: Eurex and ECB calculations.

### Chart S75 Stock prices in the euro area

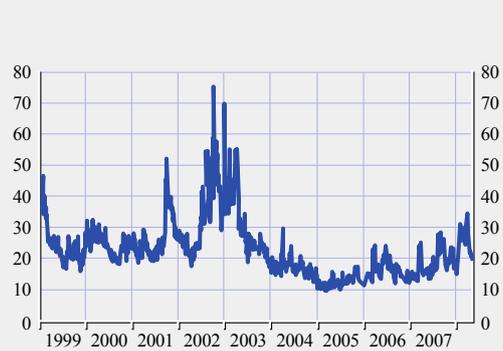
(Jan. 1999 – May 2008; index: Jan. 1999 = 100)



Source: Bloomberg.

### Chart S76 Implied volatility for the Dow Jones EURO STOXX 50 index

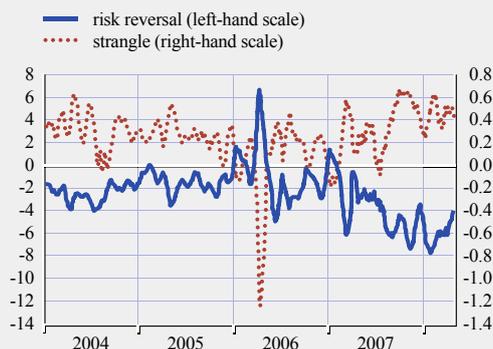
(Jan. 1999 – May 2008; %)



Source: Bloomberg.

**Chart S77 Risk reversal and strangle of the Dow Jones EURO STOXX 50 index**

(Jan. 2004 – May 2008; %; 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 – May 2008; %; 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**

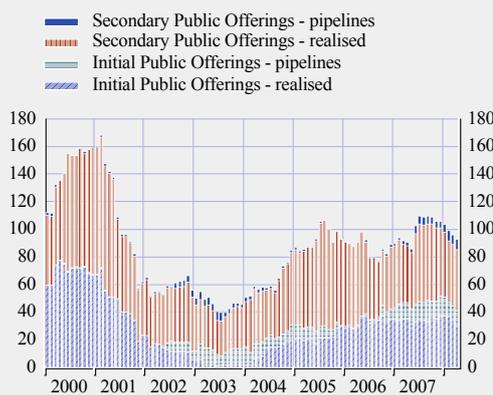
(Jan. 1999 – Mar. 2008; millions of contracts)



Source: Eurex.

**Chart S80 Gross equity issuance and pipeline deals in the euro area**

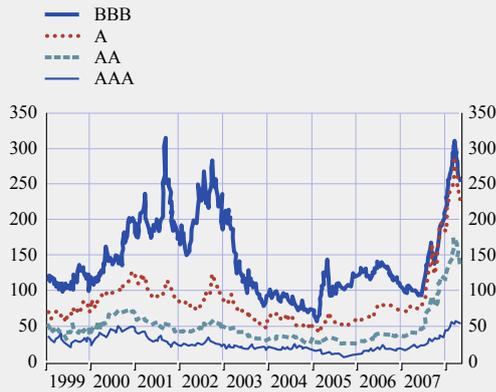
(Jan. 2000 – Apr. 2008; € billions; 12-month moving sums)



Source: Thomson Financial Datastream.

**Chart S81 Investment-grade corporate bond spreads in the euro area**

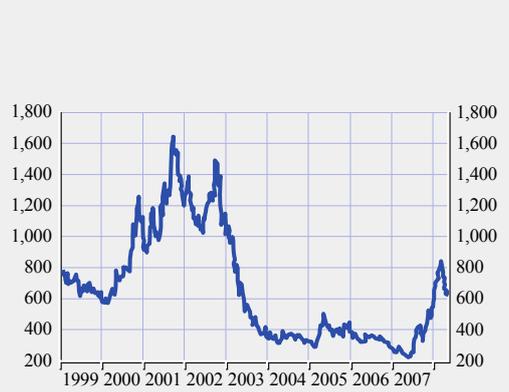
(Jan. 1999 – May 2008; basis points)



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**

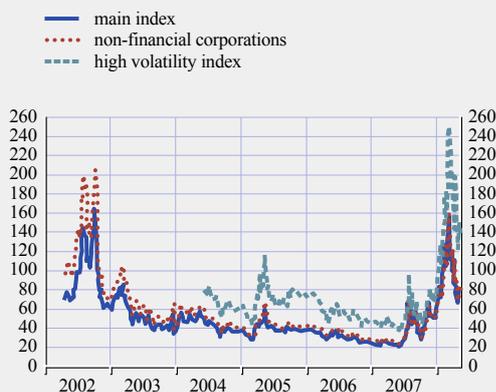
(Jan. 1999 – May 2008; basis points)



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**

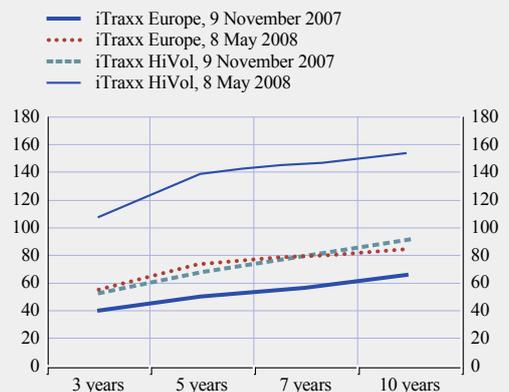
(May 2002 – May 2008; basis points)



Source: JPMorgan Chase & Co.

**Chart S84 Term structures of premiums for iTraxx Europe and HiVol**

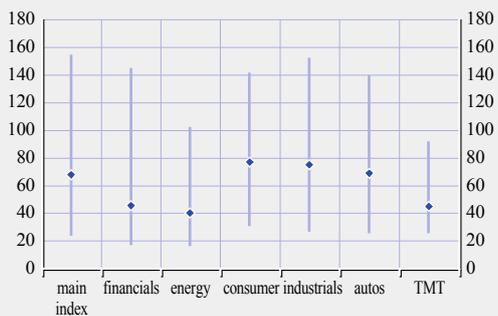
(basis points)



Source: JPMorgan Chase & Co.

Chart S85 iTraxx sector indices

(Nov. 2007 – May 2008; basis points)



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 conditions of large and complex banking groups in the euro area

(2004 – 2007)

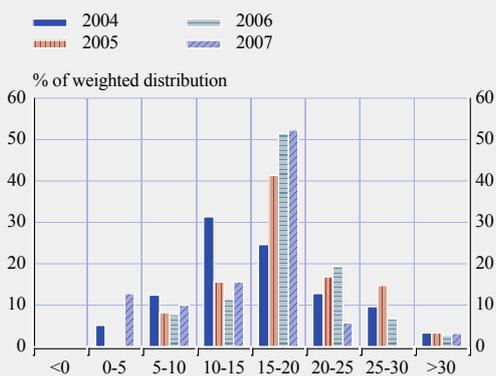
	min.	1st quartile	median	average	weighted average	3rd quartile	max.
<b>Return on equity (%)</b>							
2004	4.30	10.27	13.70	15.3	15.60	18.70	33.20
2005	9.00	13.60	16.64	17.7	18.12	20.10	37.00
2006	7.24	15.60	17.70	18.0	18.42	19.93	37.60
2007	2.97	8.75	15.40	13.8	14.27	17.00	34.25
<b>Return on risk-weighted assets (%)</b>							
2004	0.12	0.52	1.00	1.00	1.08	1.43	2.03
2005	0.33	0.90	1.15	1.20	1.28	1.54	2.26
2006	0.35	0.91	1.36	1.42	1.55	1.84	2.71
2007	0.13	0.68	0.90	1.11	1.10	1.58	2.29
<b>Net interest income (% of total assets)</b>							
2004	0.43	0.60	0.75	0.94	0.86	1.14	1.87
2005	0.48	0.57	0.61	0.85	0.83	1.15	1.84
2006	0.24	0.54	0.65	0.87	0.82	1.19	2.03
2007	0.27	0.54	0.65	0.89	0.76	1.20	1.95
<b>Net interest income (% of total income)</b>							
2004	24.33	42.85	53.05	51.90	50.49	63.24	74.66
2005	24.14	40.10	52.88	51.09	48.64	62.96	73.60
2006	14.47	37.09	50.24	47.74	44.93	57.68	70.24
2007	13.24	35.88	53.87	49.60	43.15	58.31	92.56
<b>Trading income (% of total income)</b>							
2004	2.69	6.01	9.53	11.92	13.57	17.75	29.05
2005	1.50	6.35	8.98	13.08	14.94	18.66	38.09
2006	2.45	6.78	11.40	14.71	17.04	20.82	48.19
2007	-26.76	6.19	12.02	13.39	17.45	19.77	48.98
<b>Fees and commissions (% of total income)</b>							
2004	11.55	20.61	29.34	28.33	28.95	34.73	44.64
2005	13.50	19.25	26.91	27.39	28.34	33.98	44.13
2006	14.87	22.31	29.08	28.14	29.58	34.02	43.69
2007	15.64	24.88	30.00	31.07	29.96	36.87	53.06
<b>Other income (% of total income)</b>							
2004	-3.24	2.90	5.91	7.86	6.98	9.48	26.70
2005	-0.76	3.18	4.83	8.44	8.07	3.18	40.52
2006	-0.16	2.37	7.79	9.40	8.45	11.79	43.97
2007	0.00	2.28	5.43	6.16	6.19	9.47	15.07
<b>Net loan impairment charges (% of total assets)</b>							
2004	0.03	0.05	0.07	0.11	0.09	0.11	0.40
2005	-0.02	0.02	0.05	0.08	0.08	0.11	0.29
2006	0.01	0.03	0.06	0.10	0.09	0.10	0.36
2007	0.01	0.04	0.08	0.12	0.11	0.14	0.39
<b>Cost-to-income ratio (%)</b>							
2004	44.40	55.15	67.00	63.88	66.16	70.20	85.30
2005	43.20	54.40	62.30	61.93	62.90	66.70	89.40
2006	39.60	54.78	60.40	59.97	61.11	65.00	79.80
2007	41.30	55.30	63.00	63.02	61.72	68.30	89.40
<b>Tier 1 ratio (%)</b>							
2004	6.50	7.33	7.90	8.13	8.05	8.45	10.90
2005	6.70	7.55	8.10	8.34	8.20	8.85	11.60
2006	6.70	7.42	7.80	8.27	8.13	8.77	10.50
2007	6.50	7.35	8.10	8.11	7.78	8.70	10.70
<b>Overall solvency ratio (%)</b>							
2004	8.50	10.65	11.60	11.56	11.28	12.55	13.30
2005	8.50	10.50	11.10	11.55	11.35	12.38	16.30
2006	10.00	10.58	11.06	11.41	11.35	11.81	15.60
2007	8.80	10.16	10.60	10.83	10.42	11.25	13.80

Sources: Individual institutions' financial reports and ECB calculations.

Note: Based on figures for 20 IFRS-reporting large and complex banking groups in the euro area.

**Chart S86 Frequency distribution of return on equity (ROE) for large and complex banking groups in the euro area**

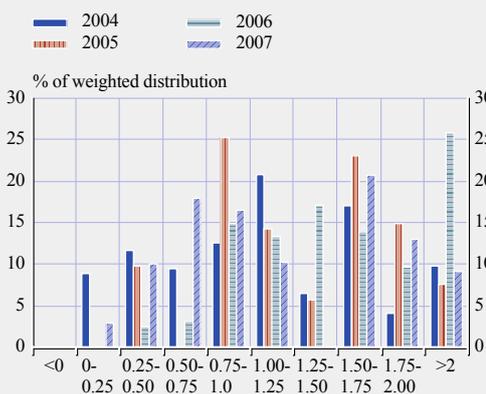
(2004 – 2007; %)



Sources: Individual institutions' financial reports and ECB calculations.  
Note: Distribution weighted by total assets. Based on figures for 20 IFRS-reporting large and complex banking groups in the euro area.

**Chart S87 Frequency distribution of return on risk-weighted assets for large and complex banking groups in the euro area**

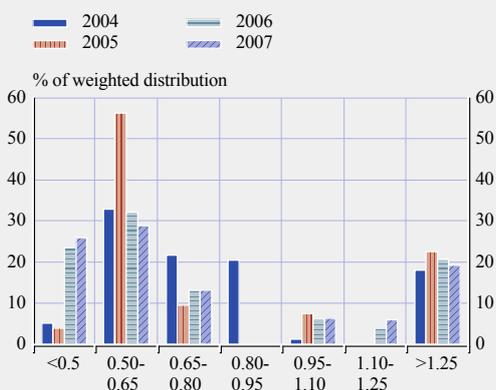
(2004 – 2007; %)



Sources: Individual institutions' financial reports and ECB calculations.  
Note: Distribution weighted by total assets. Based on figures for 20 IFRS-reporting large and complex banking groups in the euro area.

**Chart S88 Frequency distribution of net interest income for large and complex banking groups in the euro area**

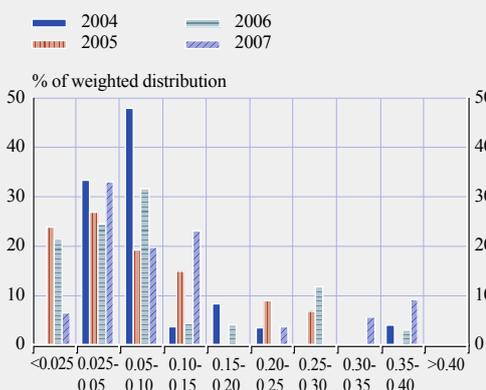
(2004 – 2007; % of total assets)



Sources: Individual institutions' financial reports and ECB calculations.  
Note: Distribution weighted by total assets. Based on figures for 20 IFRS-reporting large and complex banking groups in the euro area.

**Chart S89 Frequency distribution of net loan impairment charges for large and complex banking groups in the euro area**

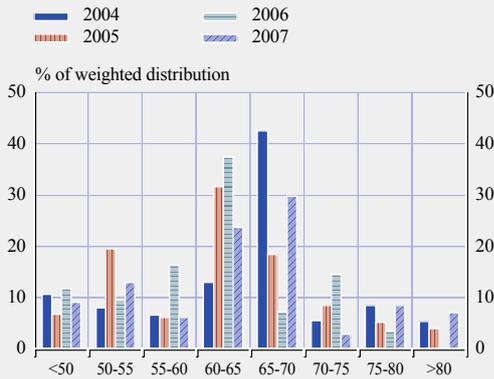
(2004 – 2007; % of total assets)



Sources: Individual institutions' financial reports and ECB calculations.  
Note: Distribution weighted by total assets. Based on figures for 20 IFRS-reporting large and complex banking groups in the euro area.

**Chart S90 Frequency distribution of cost-to-income ratios for large and complex banking groups in the euro area**

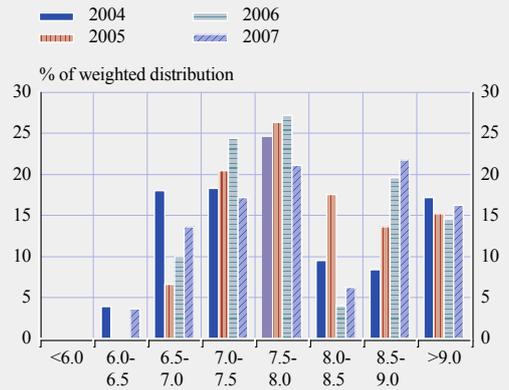
(2004 – 2007; %)



Sources: Individual institutions' financial reports and ECB calculations.  
Note: Distribution weighted by total assets. Based on figures for 20 IFRS-reporting large and complex banking groups in the euro area.

**Chart S91 Frequency distribution of Tier I ratios for large and complex banking groups in the euro area**

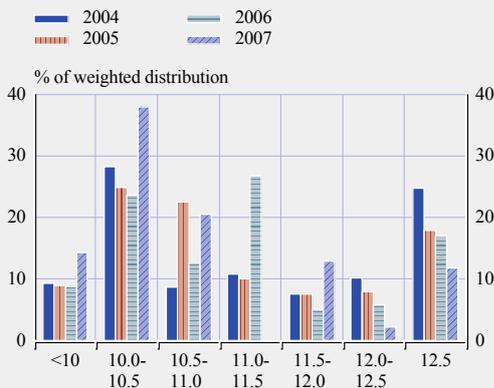
(2004 – 2007; %)



Sources: Individual institutions' financial reports and ECB calculations.  
Note: Distribution weighted by total assets. Based on 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**

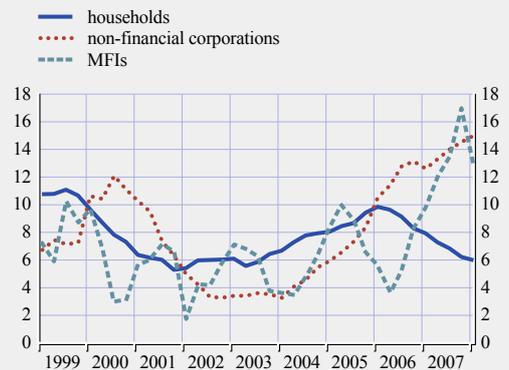
(2004 – 2007; %)



Sources: Individual institutions' financial reports and ECB calculations.  
Note: Distribution weighted by total assets. Based on 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**

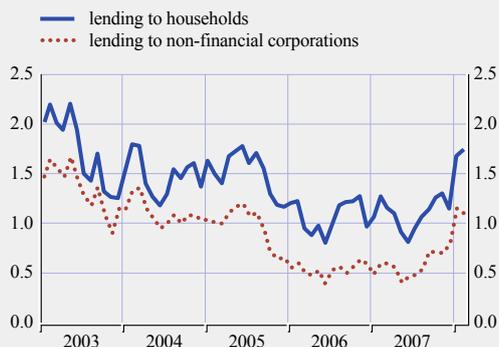
(Q1 1999 – Q1 2008; % change per annum)



Source: ECB.  
Note: Data are based on financial transactions of MFI loans.

Chart S94 Lending margins of euro area MFIs

(Jan. 2003 – Feb. 2008; % points)

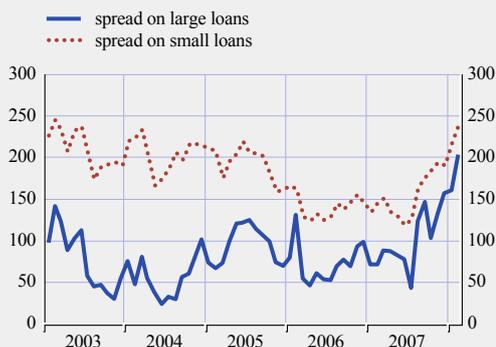


Source: ECB.

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 – Feb. 2008; basis points)

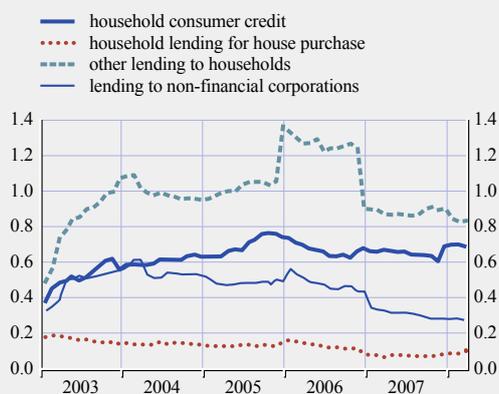


Source: ECB.

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 €1 million) and large (above €1 million) loans respectively.

Chart S96 Write-off rates on euro area MFI loans

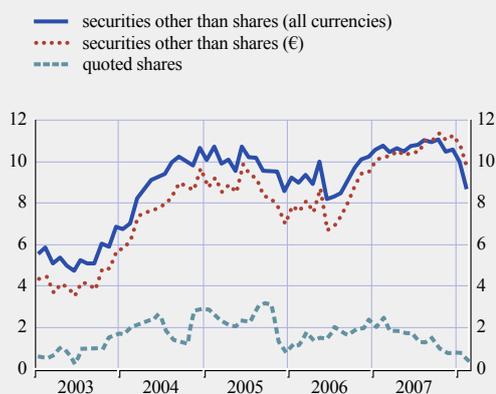
(Jan. 2003 – Mar. 2008; 12-month moving sums; % of the outstanding amount of loans)



Source: ECB.

Chart S97 Annual growth in euro area MFI securities and shares issuance

(Jan. 2003 – Feb. 2008; % change per annum)



Source: ECB.

**Chart S98 Deposit margins of euro area MFIs**

(Jan. 2003 – Feb. 2008; % points)



Source: ECB.  
 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 – Q4 2007)

— USD securities other than shares (% of total foreign currency-denominated securities other than shares)  
 ..... USD loans (% of total foreign currency-denominated loans)

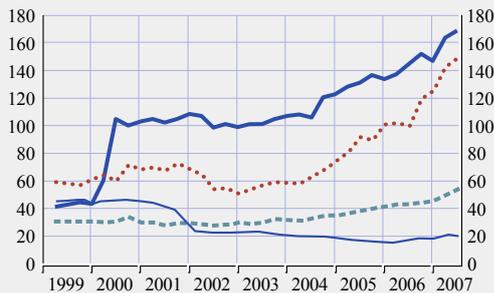


Source: ECB.

**Chart S100 International exposure of euro area banks to Latin American countries**

(Q2 1999 – Q3 2007; USD billions)

— Mexico  
 ..... Brazil  
 - - - Chile  
 — Argentina



Source: BIS.

**Chart S101 International exposure of euro area banks to Asian countries**

(Q2 1999 – Q3 2007; USD billions)

— South Korea  
 ..... India  
 - - - China  
 — Thailand



Source: BIS.

**Table S6 Euro area consolidated foreign claims of reporting banks on individual countries**

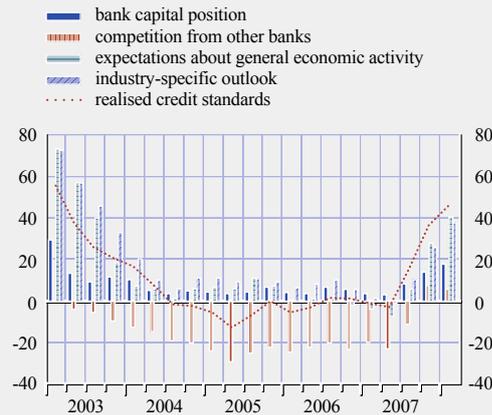
(USD billions)

	2005				2006				2007		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
<b>Total all countries</b>	<b>5,789.4</b>	<b>5,993.4</b>	<b>6,088.2</b>	<b>5,888.9</b>	<b>6,427.5</b>	<b>6,867.2</b>	<b>7,069.6</b>	<b>7,617.4</b>	<b>8,525.6</b>	<b>9,015.2</b>	<b>8,935.2</b>
<b>Total non-developed countries (incl. offshore centres)</b>	<b>1,435.5</b>	<b>1,551.8</b>	<b>1,600.0</b>	<b>1,574.7</b>	<b>1,688.2</b>	<b>1,804.2</b>	<b>1,870.5</b>	<b>2,073.2</b>	<b>2,301.3</b>	<b>2,532.1</b>	<b>2,504.2</b>
Hong Kong	35.9	48.1	54.2	46.9	44.9	56.1	54.8	54.9	53.5	54.6	56.6
Singapore	35.8	38.7	39.7	38.2	43.3	46.4	52.9	45.0	53.1	71.7	59.1
<b>Total offshore centres</b>	<b>425.6</b>	<b>446.1</b>	<b>447.8</b>	<b>436.8</b>	<b>474.1</b>	<b>506.8</b>	<b>516.5</b>	<b>549.0</b>	<b>595.9</b>	<b>658.8</b>	<b>718.9</b>
China	25.3	23.4	23.1	22.5	25.4	29.8	29.9	35.0	39.2	57.7	57.4
India	25.8	27.9	26.7	26.2	29.7	31.5	33.5	35.5	40.9	45.4	50.7
Indonesia	15.4	15.0	14.2	13.2	14.4	15.3	16.2	16.5	19.2	20.4	19.6
Malaysia	10.1	10.9	9.7	8.8	10.6	12.4	12.1	11.4	14.4	14.3	13.3
Philippines	9.2	8.6	8.7	8.7	9.2	8.6	7.9	8.1	8.8	8.8	7.6
South Korea	34.6	37.2	37.1	36.3	41.7	56.0	60.3	61.4	74.7	78.8	85.9
Taiwan China	20.9	18.7	17.1	17.5	18.7	18.7	18.0	18.5	17.6	20.2	21.8
Thailand	6.7	6.6	6.0	5.8	7.1	7.3	8.3	8.0	9.6	8.7	9.0
<b>Total Asia and Pacific EMEs</b>	<b>172.1</b>	<b>173.1</b>	<b>168.3</b>	<b>165.3</b>	<b>184.2</b>	<b>211.1</b>	<b>220.1</b>	<b>233.2</b>	<b>268.4</b>	<b>306.9</b>	<b>321.7</b>
Cyprus	37.4	40.1	41.6	42.1	44.7	50.1	53.2	53.3	58.9	65.5	69.7
Czech Republic	45.5	63.0	65.8	56.7	59.4	65.0	69.6	78.2	91.8	94.2	59.9
Hungary	50.4	61.9	63.0	58.0	60.1	63.0	66.2	73.6	88.4	92.4	69.1
Poland	88.5	93.6	97.7	83.1	88.0	92.9	96.2	107.7	141.0	151.7	153.2
Russia	40.0	49.2	53.4	57.6	62.2	63.0	63.6	72.3	90.5	109.3	111.3
Turkey	26.8	28.3	29.5	30.3	35.2	34.5	40.2	59.0	63.2	63.7	73.7
<b>Total European EMEs and new EU Member States</b>	<b>428.0</b>	<b>513.1</b>	<b>543.2</b>	<b>519.4</b>	<b>557.9</b>	<b>604.6</b>	<b>638.7</b>	<b>754.1</b>	<b>881.4</b>	<b>948.2</b>	<b>813.4</b>
Argentina	18.1	17.5	17.1	16.4	16.0	16.7	17.6	19.2	19.2	20.9	21.0
Brazil	73.9	80.7	91.7	89.6	100.9	101.6	99.5	119.2	125.6	142.5	149.0
Chile	35.1	36.4	38.5	40.2	41.5	43.2	42.9	44.4	45.7	49.8	54.2
Colombia	7.4	8.1	8.1	9.8	10.2	10.0	10.4	11.5	13.4	15.3	14.7
Ecuador	0.9	0.8	0.9	0.9	0.7	0.6	0.7	0.6	0.7	0.6	1.1
Mexico	121.9	127.6	130.5	135.8	133.3	136.6	143.3	151.2	146.1	162.8	168.0
Peru	9.9	10.3	10.4	11.1	7.0	6.9	6.6	7.2	7.8	8.2	9.3
Uruguay	2.3	2.1	2.2	2.4	2.5	2.5	2.6	2.6	2.9	3.1	2.9
Venezuela	14.3	15.6	16.6	18.7	18.6	19.3	19.2	22.8	22.8	23.2	24.1
<b>Total Latin America</b>	<b>294.4</b>	<b>309.4</b>	<b>326.4</b>	<b>335.8</b>	<b>341.2</b>	<b>350.1</b>	<b>354.8</b>	<b>390.9</b>	<b>396.2</b>	<b>440.1</b>	<b>458.6</b>
Iran	12.0	12.5	12.8	11.8	11.9	12.0	11.8	11.7	11.9	11.8	11.8
Morocco	12.6	11.0	12.7	12.5	13.1	13.7	13.8	14.8	15.3	16.2	18.2
South Africa	12.5	11.8	12.2	11.4	14.9	12.8	15.4	14.5	15.6	18.5	18.5
<b>Total Middle East and Africa</b>	<b>115.3</b>	<b>110.1</b>	<b>114.2</b>	<b>117.3</b>	<b>130.6</b>	<b>131.5</b>	<b>140.4</b>	<b>146.0</b>	<b>159.4</b>	<b>178.1</b>	<b>191.6</b>

Source: BIS.

**Chart S102 Euro area banks' credit standards applied to loans and credit lines to enterprises and contributing factors**

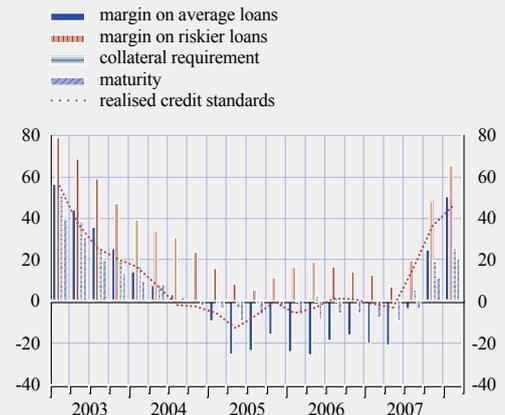
(Q1 2003 – Q1 2008; net %; two-quarter moving average)



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**

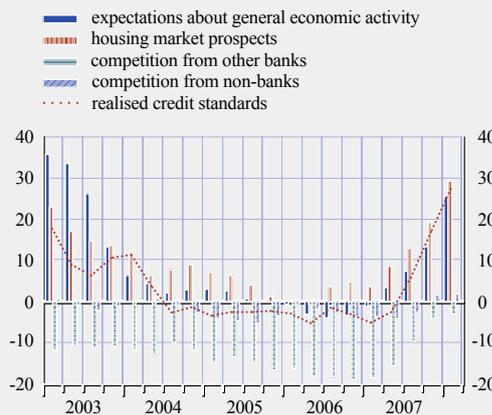
(Q1 2003 – Q1 2008; net %; two-quarter moving average)



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**

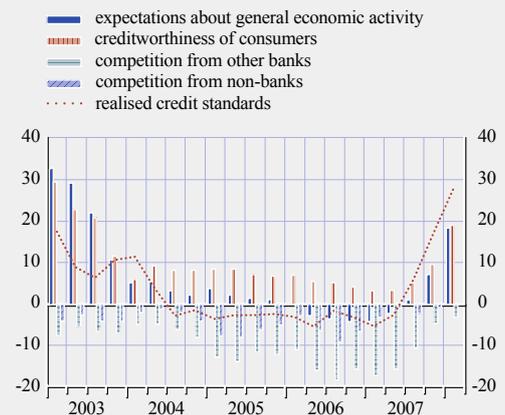
(Q1 2003 – Q1 2008; net %; two-quarter moving average)



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**

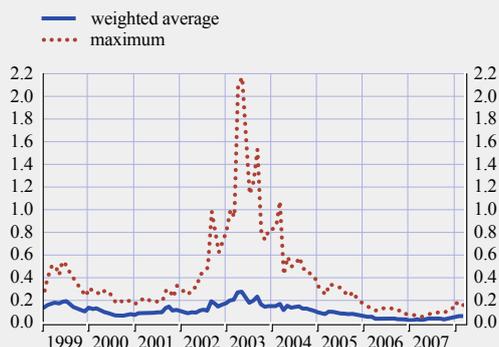
(Q1 2003 – Q1 2008; net %; two-quarter moving average)



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. 2008; % probability)



Sources: Moody's KMV and ECB calculations.  
Note: 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**

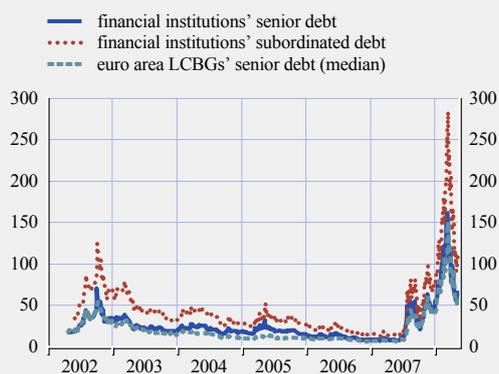
(Jan. 1999 – Mar. 2008)



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 2008; 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**

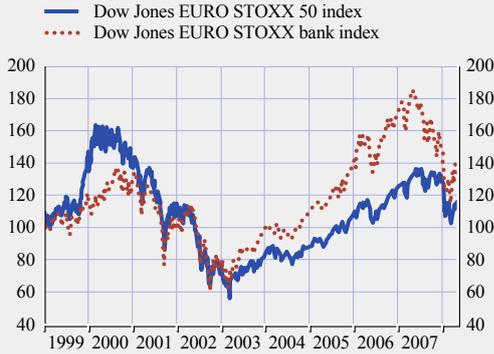
(Q1 1999 – Q4 2008; % change per annum; weighted average)



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**

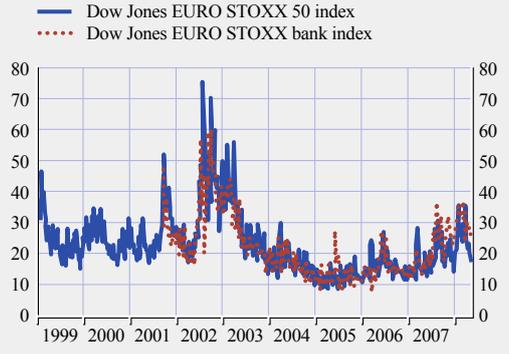
(Jan. 1999 – May 2008; index: Jan. 1999 = 100)



Source: Bloomberg.

**Chart S111 Implied volatility for Dow Jones EURO STOXX total market and bank indices**

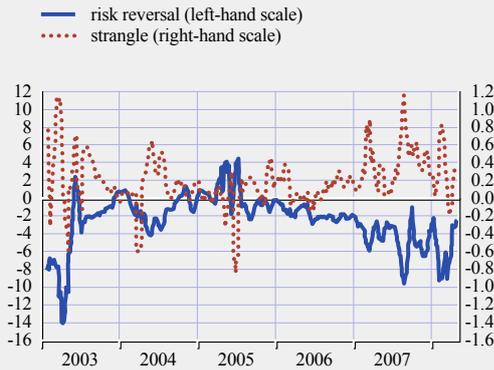
(Jan. 1999 – May 2008; %)



Source: Bloomberg.

**Chart S112 Risk reversal and strangle of the Dow Jones EURO STOXX bank index**

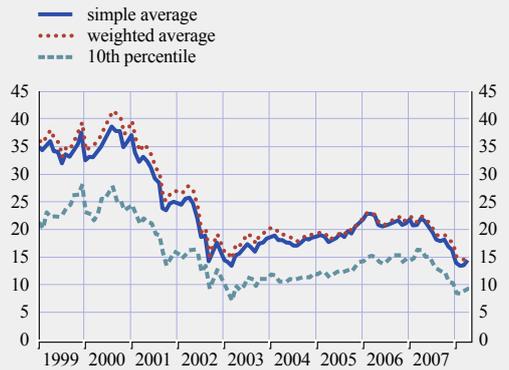
(Feb. 2003 – May 2008; %; implied volatility; 20-day moving average)



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**

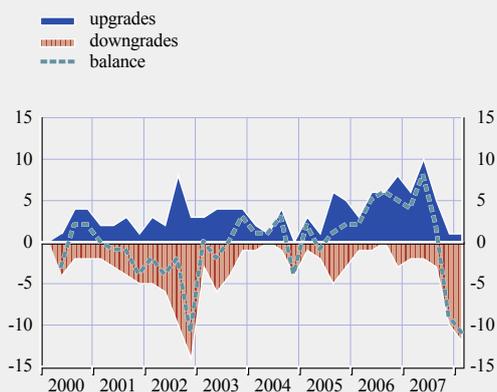
(Jan. 1999 – Apr. 2008; %; ten-year trailing earnings)



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 Rating actions for large and complex banking groups in the euro area**

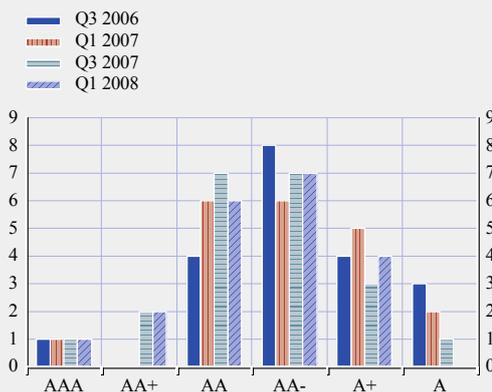
(Q1 2000 – Q1 2008; number)



Sources: Moody's, Fitch Ratings and Standard and Poor's.  
Note: This includes both outlook and actual rating changes.

**Chart S115 Distribution of ratings for large and complex banking groups in the euro area**

(number of banks)



Sources: Moody's, Fitch Ratings and Standard and Poor's.

**Table S7 Rating averages and outlooks for large and complex banking groups in the euro area**

(April 2008 and, in brackets, as at September 2007)

	Moody's	S&P	Fitch	Total
Ratings available out of sample	20	20	20	60
Outlook available	20	20	20	60
Rating average	Aa2 (Aa1)	AA- (AA-)	AA- (AA-)	AA- (AA-)
Outlook average	-0.15 (-0.05)	-0.30 (0.25)	0.00 (0.20)	-0.15
Number of negative outlooks	3 (2)	6 (0)	2 (0)	11 (2)
Number of positive outlooks	0 (1)	0 (5)	2 (4)	2 (10)

Rating codes	Moody's	S&P	Fitch	Numerical equivalent
	Aaa	AAA	AAA	1
	Aa1	AA+	AA+	2
	Aa2	AA	AA	3
	Aa3	AA-	AA-	4
	A1	A+	A+	5
	A2	A	A	6
	A3	A-	A-	7

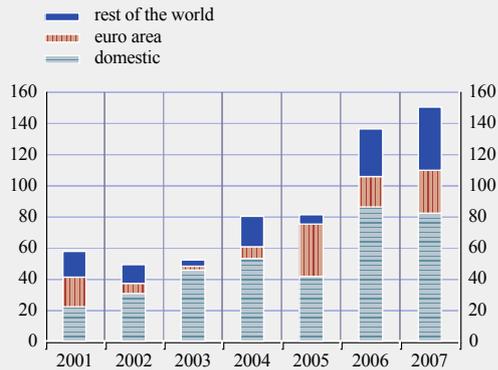
  

Outlook	Stable	Positive	Negative
Numerical equivalent	0	1	-1

Sources: Moody's, Fitch Ratings, Standard and Poor's and ECB calculations.

**Chart S116 Value of mergers and acquisitions by euro area banks**

(2001 – 2007; € billions)

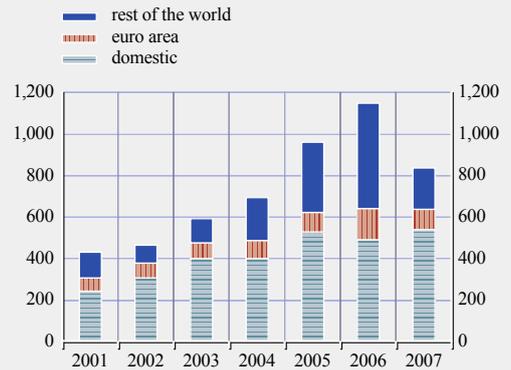


Sources: Bureau van Dijk (ZEPHYR database) and ECB calculations.

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 S117 Number of mergers and acquisitions by euro area banks**

(2001 – 2007; total number of transactions)

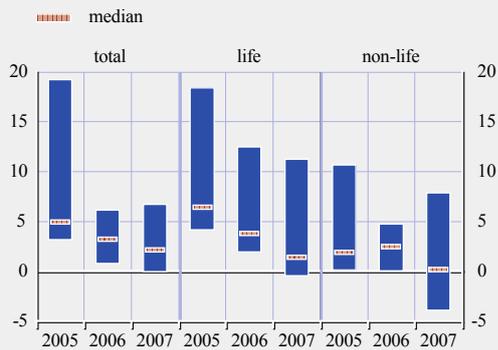


Sources: Bureau van Dijk (ZEPHYR database) and ECB calculations.

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 S118 Distribution of gross-premium-written growth for a sample of large euro area insurers**

(2005 – 2007; % change per annum; interquartile distribution)

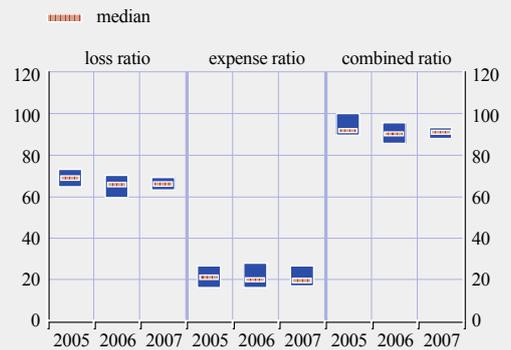


Sources: Bloomberg and ECB calculations.

Note: Based on figures for 30 large euro area insurers.

**Chart S119 Distribution of loss, expense and combined ratios in non-life business for a sample of large euro area insurers**

(2005 – 2007; % of premiums earned; interquartile distribution)

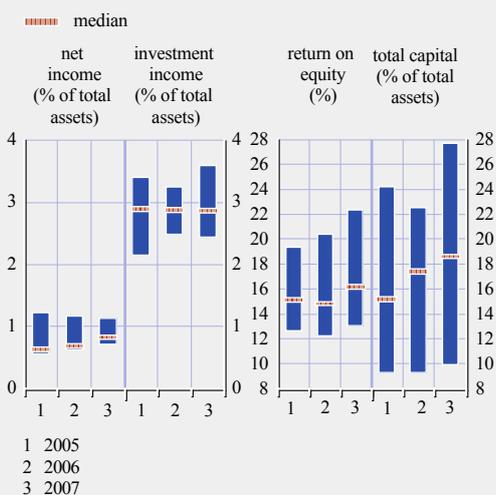


Sources: Bloomberg and ECB calculations.

Note: Based on figures for 30 large euro area insurers.

**Chart S120 Distribution of income, profitability and solvency for a sample of large euro area insurers**

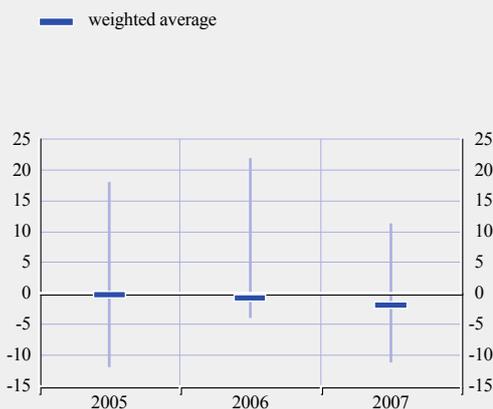
(2005 – 2007; interquartile distribution)



Sources: Bloomberg and ECB calculations.  
Note: Based on figures for 30 large euro area insurers.

**Chart S121 Distribution of gross-premium-written growth for a sample of large euro area reinsurers**

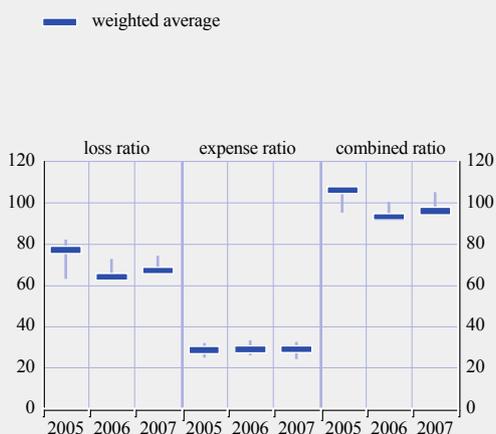
(2005 – 2007; % change per annum; maximum-minimum distribution)



Sources: Bloomberg and ECB calculations.  
Note: Based on figures for five large euro area reinsurers.

**Chart S122 Distribution of loss, expense and combined ratios for a sample of large euro area reinsurers**

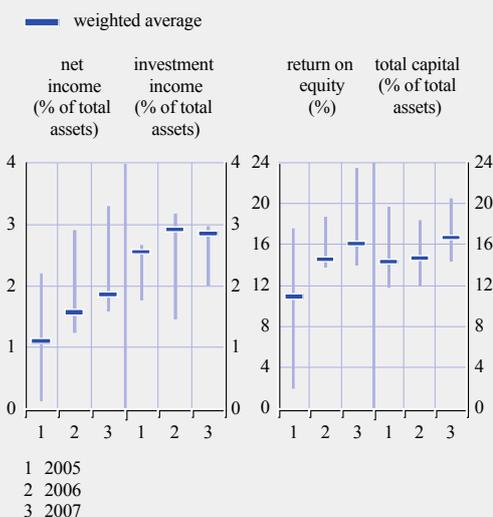
(2005 – 2007; % of premiums earned; maximum-minimum distribution)



Sources: Bloomberg and ECB calculations.  
Note: Based on figures for five large euro area reinsurers.

**Chart S123 Distribution of income, profitability and solvency for a sample of large euro area reinsurers**

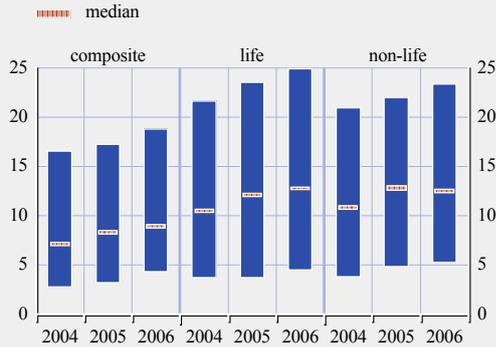
(2005 – 2007; maximum-minimum distribution)



Sources: Bloomberg and ECB calculations.  
Note: Based on figures for five large euro area reinsurers.

**Chart S124 Distribution of equity asset shares of euro area insurers**

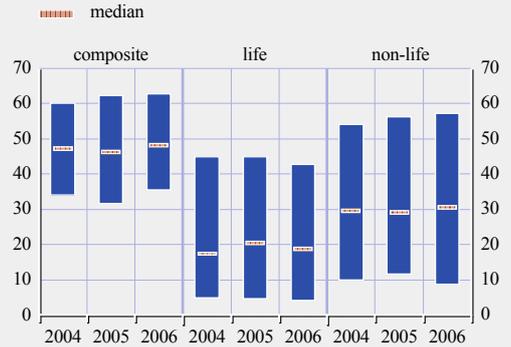
(2004 – 2006; % of total assets; interquartile distribution)



Source: Standard and Poor's (Eurothesys database).

**Chart S125 Distribution of bond asset shares of euro area insurers**

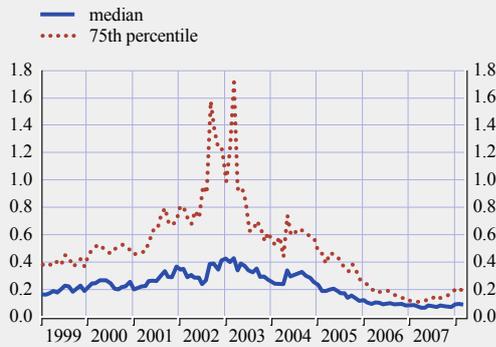
(2004 – 2006; % of total assets; interquartile distribution)



Source: Standard and Poor's (Eurothesys database).

**Chart S126 Expected default frequencies (EDFs) for the euro area insurance sector**

(Jan. 1999 – Mar. 2008; % probability)



Source: Moody's KMV.  
Note: Due to measurement considerations, the EDF values are restricted by Moody's KMV to the interval between 0.01% and 35%.

**Chart S127 Subordinated bond asset swap spread for the euro area insurance sector**

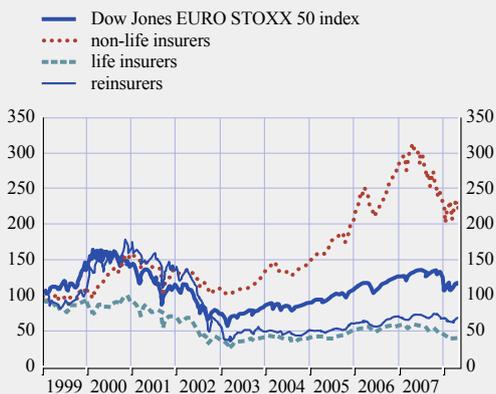
(Jan. 2001 – May 2008; basis points)



Source: JPMorgan Chase & Co.

**Chart S128 Dow Jones EURO STOXX total market and insurance indices**

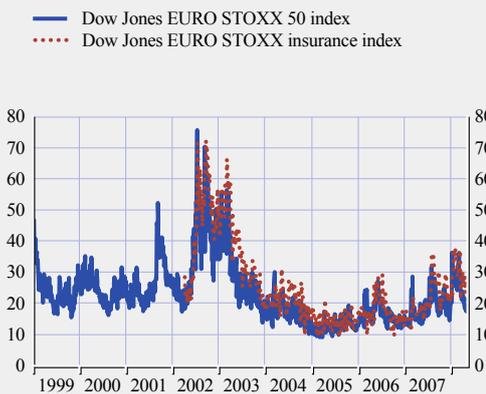
(Jan. 1999 – May 2008; index: Jan. 1999 = 100)



Source: Thomson Financial Datastream.

**Chart S129 Implied volatility for Dow Jones EURO STOXX total market and insurance indices**

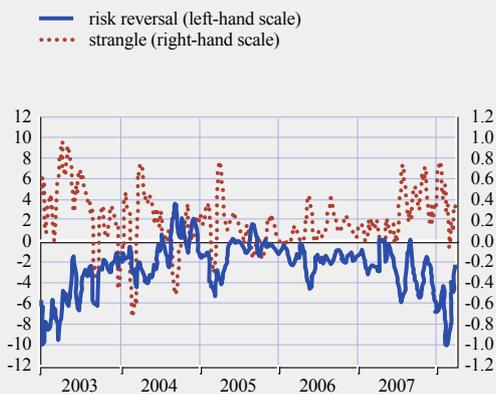
(Jan. 1999 – May 2008; %)



Source: Bloomberg.

**Chart S130 Risk reversal and strangle of the Dow Jones EURO STOXX insurance index**

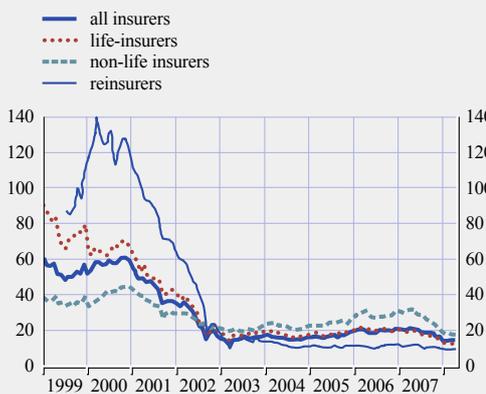
(Jan. 2003 – May 2008; %; implied volatility; 20-day moving average)



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 S131 Price-earnings (P/E) ratios for euro area insurers**

(Jan. 1999 – Apr. 2008; %; ten-year trailing earnings)

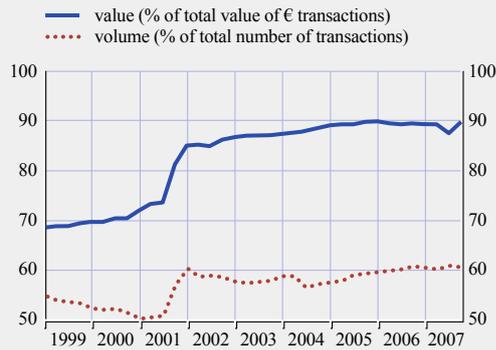


Sources: Thomson Financial Datastream and ECB calculations.  
 Note: The P/E ratio is based on prevailing stock prices relative to an average of the previous ten years of earnings.

## 6 EURO AREA FINANCIAL SYSTEM INFRASTRUCTURES

**Chart S132 Large-value payments processed via TARGET**

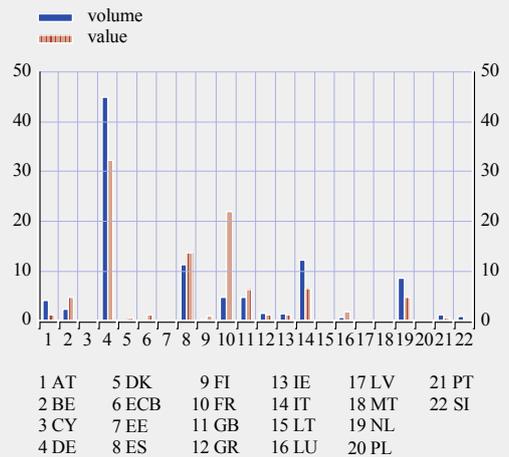
(Q1 1999 – Q4 2007)



Source: ECB.

**Chart S133 Large-value payments processed via TARGET, by country**

(Q2 2007 – Q4 2007; % of the NCB/ECB shares in terms of value and volume)



Source: ECB.

Note: The figures for BI-REL (IT) include SORBNET EURO (PL) and EP RTGS (EE). The figures for RTGS<sup>plus</sup> (DE) include Slovenia (SI). Eesti Pank joined TARGET on 20 November 2006 and connected its RTGS system via BI-REL (IT). Banka Slovenije has used RTGS<sup>plus</sup> (DE) to connect to TARGET since the commencement of its operations as a member of the Eurosystem on 2 January 2007. As of 1 January 2007 Sveriges Riksbank no longer participates in TARGET.

**Chart S134 TARGET availability**

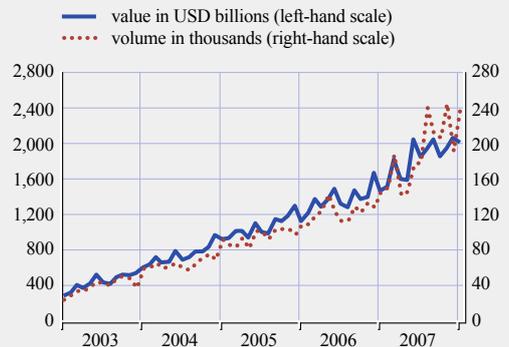
(Jan. 1999 – Mar. 2008; %; three-month moving average)



Source: ECB.

**Chart S135 Volumes and values of foreign exchange trades settled via Continuous Linked Settlement (CLS)**

(Jan. 2003 – Mar. 2008)



Source: ECB.

ISSN 1830-2017



9 771830 201004