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Financial Stability Review 2009

National Bank of Belgium

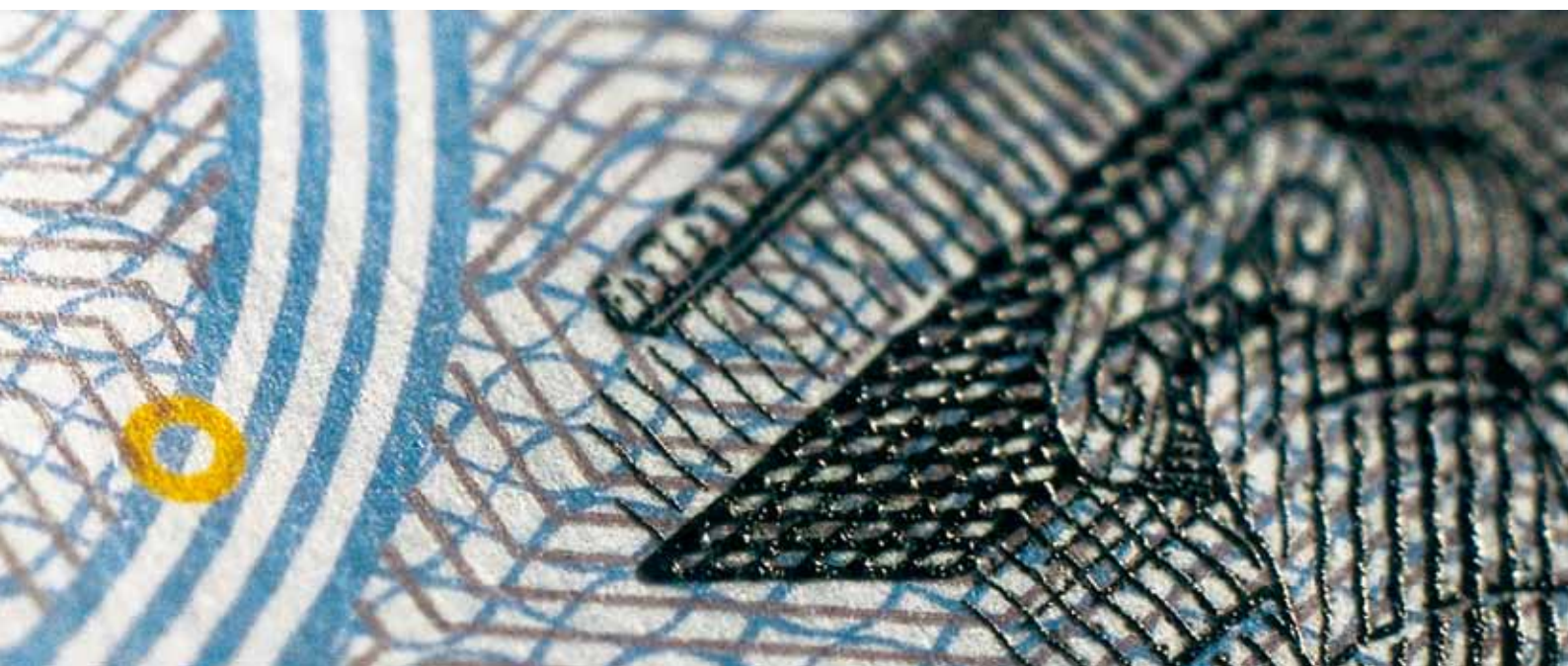
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Financial Stability Review 2009



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The Financial Stability Review is the result of a collective effort. The following persons have actively contributed to this issue of the Review:

P. Praet from the National Bank of Belgium and the Banking, Finance and Insurance Commission; N. Boeckx, B. Bourtembourg, A. Francart, T. Franck, J. Janssens, N. Jijakli, J. Keller, J. Mitchell, J. Pissens, Th. Schepens, Ch. Stas, Th. Timmermans, S. Van Cauwenberge, F. Vancompernelle, P. Van Roy, C. Vespro from the National Bank of Belgium; J. Annaert and M. De Ceuster as external experts.

Foreword

by Guy Quaden, Governor



The severe crisis which has hit the global financial sector over the last two years has impaired the ability of the system to smoothly perform its essential role of intermediation between savers and borrowers. In order to restore confidence, eroded by various excesses, and to limit the development of a negative feedback loop between the real economy and the financial sector, most governments have set up extensive intervention programmes. They have injected huge amounts of capital to strengthen the solvency of large systemic institutions, relieved funding constraints by guaranteeing some of the new liabilities of major financial intermediaries, or taken over part of the risks associated with inferior-quality assets on banks' balance sheets. All these various measures have complemented the numerous steps that central banks have taken to meet the liquidity needs of financial institutions by reducing policy rates, widening the range of collateral accepted, extending the maturity of lending operations and, more recently, by considering recourse to unconventional monetary tools to reactivate credit and funding markets.

These public interventions have understandably received a lot of attention due to their high visibility and to the pressing need to address the most direct effects of the crisis. They should not obscure the more structural measures which are called for at both national and international level to correct fundamental flaws that have been revealed in the way the financial system works. The structural reform of the functioning and oversight of the system should revolve around four main lines.

First of all, a more global approach to regulation and supervision needs to be established. Up to now, both have been largely considered on a functional basis. However, the globalisation of financial markets has clearly shown that it was a delusion to focus on establishments bearing the names of banks, if other institutions or structures involved in banking-type activities without actually carrying a bank label were springing up alongside them, outside regulatory control. It is not enough just to accept this principle; it still has to be applied dynamically and with a readiness to widen the supervisory net to any new category of institutions that might come to acquire systemic importance.

The notion of a global approach nevertheless has a second and more fundamental dimension to it. The systemic nature of the financial crisis has confirmed that the supervisory authorities' microprudential approach, aimed at detecting symptoms of any weakening at the level of individual institutions, is insufficient. It must be supplemented by a macroprudential analysis of the risks of individual behaviour or difficulties spreading to the whole of the financial system and becoming systemic. It is up to the central banks, which are called to the rescue when these types of risks

materialise, to carry out this macroprudential function. To that end, they benefit from their place at the centre of payment and settlement systems and their close day-to-day contacts with the money markets. But they cannot play this role to the full unless they immediately and directly receive comprehensive information that is relevant for the assessment of systemic risks. This includes the possibility of directly contacting the financial institutions in order to get primary data and an in-depth understanding of ongoing developments.

Next, supervision and regulation have to take a longer-term perspective. The profile of the current crisis is not actually new. It reflects previous experience and many other episodes where a long period of euphoria was abruptly interrupted by a major crisis. Moreover, it is more often than not the same collective behaviour serving to intensify and spread the euphoria that subsequently exacerbates the crisis.

While cycles cannot be entirely prevented from developing, we need to limit the amplifying effects by precautionary measures. It is during the expansion phase, when new risks are taken on, but have not yet materialised, that financial institutions should build up their reserves. This calls for changes to arrangements governing own funds, and also banks' risk provisions.

A review of compensation schemes which, in many cases, have encouraged heads of financial institutions to favour short-term profits over the creation of lasting value, is also required. This issue is not confined to senior executives but also concerns other staff members, such as traders, who are in a position to significantly influence the organisation's risk-taking stance. The design of an appropriate remuneration structure must be assessed in the light of the firm's general corporate governance framework, taking into consideration the interests of other stakeholders, too, rather than just those of the shareholders.

Turning to the third theme, a better balance between regulation and market discipline is needed. The limits to this market discipline have been clearly demonstrated. It would nevertheless be illusory to want to do without it completely in the design of new supervisory and regulatory arrangements. Many new financial products have been developing at such a rapid pace that they were first only backed up by best practices or market standards, implemented by the operators themselves, before being reinforced by more formal rules. It is also necessary to avoid introducing an excess load of new rules that risk paralysing financial innovation altogether. Above all, we need better, not more, regulations.

Nevertheless, a better balancing act is warranted in many areas. For example, there is a need to reconsider the framework for accounting standard-setting, which in Europe is currently left in the hands of a non-governmental organisation. Moreover, better control is needed over the work of the rating agencies whose role calls for a serious and critical examination.

Lastly, it is essential to ensure better coordination between the various authorities. And this does not only – or even as a matter of priority – go for regulation. On this front, a lot of progress has been made towards greater standardisation, even though the work is not finished yet. The recently opened debate on "tax havens" also goes to show that new and useful fields are likely to be covered.

The need for closer coordination particularly concerns supervision, which is presently in the hands of national institutions that have very different structures and which do not have the same powers. On this point, there is still a lot more to be done in Europe, and without delay, not least setting

up a European Systemic Risk Council as recommended in the de Larosière report. It is essential to capitalise on the momentum and the sense of urgency that the crisis has created to evolve towards a structure integrating more fully the micro- and macroprudential dimension of financial stability, not only at national level but also at the wider European level.

Good coordination is equally crucial for managing the crisis. The current crisis should not lead to a resurgence of protectionism, in the form of hidden barriers to capital flows and reversion to domestic markets. Furthermore, the support measures for the economy in general and the financial sector in particular must be coordinated, not only in their implementation but also in their dismantling later, which, when the time comes, will be another very delicate stage.

Brussels, May 2009

Executive summary

1. Overview

1.1 Developments in the main bancassurance groups

The decision of the US authorities, in the weekend of 13 and 14 September 2008, not to bail out Lehman Brothers – the fourth largest US investment bank – proved to be a major turning point in the global financial crisis. The powerful deleveraging forces and severe disruption in wholesale financing markets afflicting an already fragile global financial system in the days and weeks following the failure of Lehman Brothers on 15 September put severe pressure on the profitability and liquidity position of key credit institutions and insurance companies in the Belgian financial system, requiring government interventions to stabilise market confidence.

While a material exposure to structured finance instruments undoubtedly contributed to the erosion of market and counterparty confidence in the Fortis group, its vulnerability to the extremely tense and unstable conditions in international financial markets stemmed mainly from concerns over the group's reduced financial flexibility since the acquisition of ABN AMRO. The rescue operation mounted in the weekend of 27 and 28 September by the Dutch, Belgian and Luxembourg governments proved to be the start of a long and drawn-out process, involving the forced sale of the Dutch activities (including the participation in ABN AMRO) to the Dutch State (on 3 October), the take-over of Fortis Bank Belgium by the Belgian government (on 6 October) and, subsequently, the conclusion of an agreement with the French bank BNP Paribas to acquire a majority stake in this company. While some of these transactions became the subject of legal proceedings that delayed their effective execution and implementation, a majority of Fortis' shareholders

approved the revised terms of agreement with BNP Paribas at the shareholder's meetings of Fortis SA/NV and Fortis NV at the end of April 2009.

Dexia group also required emergency interventions from the authorities at the end of September owing to refinancing problems in the aftermath of the Lehman Brothers failure. The problems resulted from the group's heavy dependence on wholesale funding markets for the financing of a large balance sheet – characterised by significant maturity mismatches – and market concerns over its high exposure to assets originated in the US. The heavy reliance on the wholesale markets reflected the fact that the group only collects retail deposits in Belgium and Luxembourg. To supplement these retail funding sources, Dexia's business model relied on the mobilisation of a large proportion of its substantial portfolio of highly-rated debt securities to borrow on the secured wholesale funding markets. Dexia group's large exposure to asset-backed securities resulted mainly from the activities of Financial Security Assurance (FSA), the US monoline insurance subsidiary of Dexia Crédit local de France. As part of its Transformation Plan, which is aimed *inter alia* at reducing the risk profile of the group, Dexia announced on 14 November 2008 that it had entered into a sale and purchase agreement with monoline bond insurer Assured Guaranty relating to the sale of FSA Holdings, excluding its Financial Products activity performed through FSA Asset Management (FSAAM). This transaction is expected to close at the end of the second quarter of 2009. The non-transferred activities of FSAAM have been consolidated in the group's accounts and put into run-off. To ring-fence Assured Guaranty from the risks related to the financial products portfolio owned by FSAAM, Dexia wrote a put option in favour of FSAAM allowing it to sell all or part of that portfolio to Dexia. The Belgian and French States agreed to guarantee the commitments of Dexia under this put option over and above a first loss of 3.1 billion US

dollar in excess of the then existing reserves of 1.4 billion US dollar. Since 9 October 2008, Dexia has benefited from the combined guarantee of the States of Belgium, France and Luxembourg covering many of its funding sources. This guarantee relates to a total maximum amount of 150 billion euro and covers Dexia's liabilities towards credit institutions and institutional counterparties, as well as bonds and other debt securities issued for the same counterparties, provided that these liabilities, bonds or securities fall due before 31 October 2011 and have been contracted, issued or renewed between 9 October 2008 and 31 October 2009. As of 13 May 2009, the outstanding amount of guaranteed funding came to 92.6 billion euro.

While KBC group did not experience institution-specific funding liquidity problems in the aftermath of the Lehman Brothers failure over and above the significant tightening of financial conditions in the wholesale markets in general, its CDS premium also spiked in October. This development followed Moody's announcement of the downgrading of the rating on a series of collateralised debt obligations created by KBC Financial Products. The group – whose uninsured exposure to these structured finance instruments came to 16 billion euro at the end of June 2008 – had to post a loss on these investments in its results for the third quarter. Since this development occurred in a period during which many European governments announced plans to help credit institutions bolster their capital buffers as an additional insurance against future losses – in line with the apparent increase in the normal standard which markets expect of a well-capitalised bank –, the Belgian government subscribed, on 27 October, to the issue of 3.5 billion euro of hybrid core capital securities, which KBC has used to increase its core Tier I capital in the banking business by 2.25 billion euro and the capital base of the insurance business by 1.25 billion euro. In January 2009, KBC's capital base was further strengthened by a similar transaction with the Flemish regional government, this time for 2 billion euro, plus a supplementary stand-by facility of 1.5 billion euro. This transaction followed a period of sharp falls in KBC's share price, related to the announcement by Moody's of a revision of the assumptions underlying its ratings for corporate synthetic CDOs at the end of 2008, and heightened concerns over the economic prospects in a number of countries where KBC is present through subsidiaries, including in Central and Eastern Europe, where it has developed a second home market. In May 2009, KBC announced significant losses on a portfolio of CDOs covered by an insurance from the monoline insurance company MBIA. The value of this credit protection bought from MBIA declined significantly when MBIA announced a restructuring, which included the spin-off of valuable assets from the

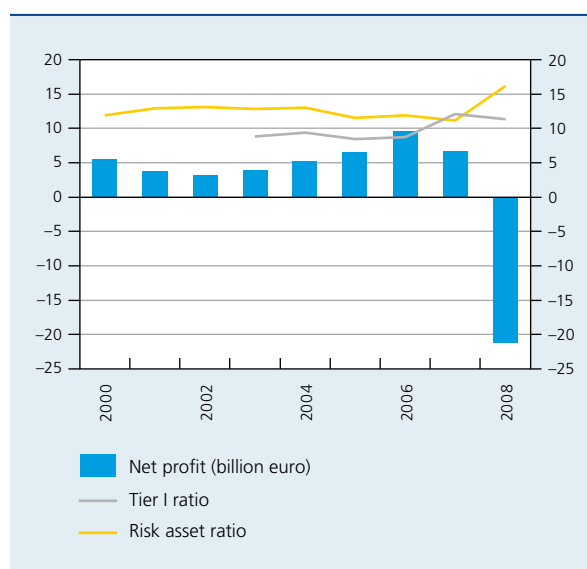
unit being KBC's counterparty. On 13 May 2009, the Federal government decided to grant KBC a guarantee on structured credit instruments with an initial value of 22.5 billion euro.

One major insurance company, Ethias, required a government-sponsored recapitalisation, due mainly to losses on its large stake in the Dexia group. That participation was a legacy of Ethias' origins as an insurance company concentrating on serving local authorities, public enterprises and civil servants. The sharp fall in Dexia's share price in the second half of 2008 magnified the amount of unrealised losses on the portfolio of financial assets held by Ethias, threatening the group's solvency and prompting a request from the CBFA for corrective measures. On 21 October, that request led to the capital injection of 1.5 billion euro by public authorities.

1.2 Banking sector

Looking at the aggregate data for the Belgian banking sector, the *annus horribilis* for the main Belgian bancassurance groups revealed itself most clearly in the unprecedented deterioration in the sector's bottom-line result, showing a loss of 21.2 billion euro (Chart 1). Exceptional losses and one-off risk charges related to the restructuring and de-risking strategies undertaken at the main bancassurance groups account for a significant share of these losses. To the extent that these actions relieved banks

CHART 1 PROFITABILITY AND SOLVENCY
(consolidated data, percentages, unless otherwise stated)



Sources : CBFA, NBB.

TABLE 1 IMPACT OF VALUATION CHANGES ON FINANCIAL ASSETS HELD BY BELGIAN CREDIT INSTITUTIONS
(consolidated data, billion euro)

| | 2006 | 2007 | 2008 |
|--|------|------|------|
| Impact via the profit and loss account (flows during the period) | | | |
| Realised or unrealised gains or losses (–) on financial instruments | 3.9 | 3.8 | –3.8 |
| of which: on fixed-income instruments and associated derivatives contained in the portfolio held for trading | 0.5 | –0.9 | –4.9 |
| Impairments | 0.4 | 2.9 | 12.6 |
| of which: on securities available for sale | 0.0 | 2.5 | 7.4 |
| Impact via accounting equity (stock at end of period) | | | |
| Revaluation reserve for securities available for sale | 2.8 | –0.6 | –8.0 |

Sources: CBFA, NBB.

of business strategies and legacy exposures unsuited to, or vulnerable in, the current challenging – and in some respects structurally changing – operating environment, they will contribute to the restoration of profitability in the future. Such an ability to generate profits is the first buffer against unexpected adverse developments in the operating environment.

In spite of the large loss recorded in the income statement, the risk asset ratio rose to 16.2 p.c. in 2008, while the Tier I ratio stabilised at a level above 11 p.c. Both indicators express capital buffers in terms of risk-weighted assets. The changes in these solvency ratios between 2007 and 2008 reflect a number of factors, including government-led recapitalisations through Tier I capital instruments (as described in the previous section), the complete transition in 2008 to the Basel II framework for the calculation of risk-weighted assets, and the composition of the income statement loss reported last year. Net valuation and impairment losses on financial instruments and securities available for sale – whether or not transiting through the income statement and whether or not of a permanent nature – amounted to 18.6 billion euro in 2008 (Table 1).

While the exceptional nature of most of these losses could be interpreted as a sign that Belgian banks will be able to return quickly to profitability, the development of the net result will also depend on the underlying performance of some other important components of the income statement, such as net interest revenues and fee income or the level of impairments on financial assets and loans. The increase in net interest income in 2008 reversed a

period of low to moderate growth in this income component in spite of rising deposit and loan volumes, as these were offset to a large extent by a decrease in the average margin earned between interest-yielding assets and interest-costing liabilities. While these opposing developments in the price and volume determinants were partially linked to the strong volume growth in low-margin business activities, such as (reverse) repurchase agreements and other forms of secured financing, they also reflected downward pressures on commercial lending and deposit margins as a result of strong competition in recent years. The side effect of the strong expansion of the interest-earning assets on the balance sheets of Belgian banks in recent years is a potentially higher exposure to credit losses in the coming quarters, given the sharp economic downturn in the global economy. The loan loss ratio has already increased sharply in 2008, suggesting that credit losses on the more traditional loan books could constitute a second wave of losses for the Belgian banking sector, and a significant drain on the profitability of the banks in the coming quarters. This rise follows a period of exceptionally low loan losses.

The two principal sources of credit risk exposures (in gross terms) in the Belgian banking system are the loans and the extensive debt securities portfolio.

The total loan portfolio of Belgian banks declined by almost 220 billion euro or 22 p.c. in 2008. More than four-fifths of this decline can be attributed to the deconsolidation of Fortis Bank Nederland Holding from Fortis Bank. The rest of the decline mainly resulted from a reduction in loans and advances to credit institutions.

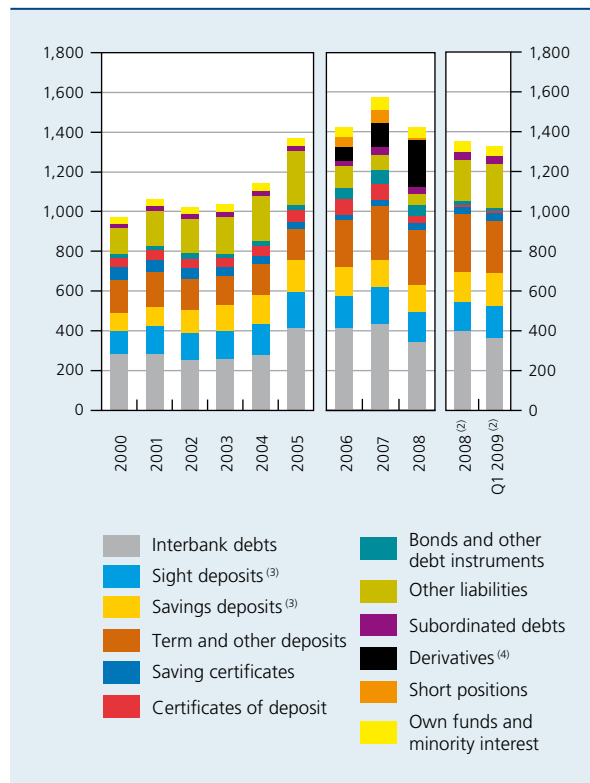
As a result of the latter factor, which mainly affected the loans and advances to banks established outside of the euro area, the share of interbank loans in total loans and advances declined to 27.7 p.c. (down from 32.5 p.c. in 2007). Loans and advances to corporates now account for 37.8 p.c. of the total, versus 31.8 p.c. in the year before, reflecting a rise in loans and advances to corporates situated in Belgium. While loans and advances to retail clients in euro area countries other than Belgium dropped from 104 billion euro at the end of 2007 to 39 billion at the end of 2008 as a result of the dismemberment of the Fortis group, the exposures to retail clients in the rest of the world (including the exposures of subsidiaries in non euro area EU Member States and Turkey) rose from 20.9 billion euro to 27.9 billion euro.

It is in this retail category that the most significant deterioration appears to have taken place in the percentage of loans that is considered to be impaired, with a rise from 2.8 p.c. to 3.4 p.c. The percentage of impaired loans and advances for the corporate counterparty only rose from 2.3 p.c. to 2.4 p.c. Overall the non-performing loan ratio for total loans and advances climbed from 1.6 p.c. to 2.0 p.c. The coverage ratio of these loans stood at 41 p.c. in 2008, up from 32 p.c. in 2007.

The composition of the debt securities portfolio has been rebalanced towards government securities, whose share has risen from 46 p.c. to 52 p.c. Exposures to corporate debt securities, which include structured credit instruments, remained stable at around 70 billion euro. On the basis of the data published by Fortis Bank, KBC Bank and Dexia Bank Belgium, the uninsured exposure to these structured credit instruments – including in the form of derivatives – has declined from around 80 billion euro at the end of 2007 to around 55 billion euro (taking account of the more than 10 billion euro of assets that Fortis Bank will transfer to a defeasance SPV).

The seizure of important professional (re)financing markets in the immediate aftermath of the Lehman Brothers failure was the main vehicle transmitting the financial market tensions to the Belgian banking sector in the second half of September. This funding and market liquidity shock came after a period during which a strong growth in the Belgian banking sector's aggregate balance sheet had taken place, rising from 1033 billion euro at the end of 2003 to 1578 billion euro at the end of 2007 (Chart 2). During this period of strong balance sheet growth, the share of – retail and wholesale – deposit funding remained stable at two-thirds of the total balance sheet. Within this total, interbank funding transactions accounted for about a quarter of the total balance sheet funding, whereby the almost equally important debt securities portfolio on the

CHART 2 BREAKDOWN OF LIABILITIES ⁽¹⁾
(end of period consolidated data, billion euro)



Sources: CBFA, NBB.

- (1) Data compiled in accordance with the Belgian accounting standards until 2005 (Belgian GAAP) and according to the IAS/IFRS from 2006.
- (2) Unconsolidated data, compiled in accordance with Belgian GAAP.
- (3) Comprising only deposits recorded at amortised cost.
- (4) Derivatives recorded at their market value, including, as from 2007, the accrued expenses (which is not included in the figure reported for 2006).

assets' side was actively used to obtain secured financing in the professional or wholesale funding markets. Given the abundant funding and market liquidity conditions in global financial markets in the years before 2007, a large variety of non-government debt securities could nevertheless be used in repo(-like) transactions with small haircuts and a low funding cost during the years of strong balance sheet growth between 2003 and 2007. Following the collapse of Lehman Brothers, certain non-prime securities were no longer accepted as loan collateral, or only on far less favourable conditions, and unsecured interbank funding markets dried up. While some thawing has occurred in these markets from the highly stressed levels observed in October and November, unsecured interbank markets continue to be dominated by short-maturity financing and non-prime collateral is generally not yet accepted in secured financing transactions. These developments contributed to a significant decline in Belgian banks' funding through unsecured financing from other credit institutions and debt instruments in the last quarter of 2008. Within

the deposits from customers (which include both retail and wholesale deposits), the shift from savings deposits to term deposits came to an end as the differences in the yield offered by these deposits narrowed due to a sharp increase in the rate on savings deposits in the summer of 2008 and subsequent falls in the yield of term deposits in line with the downward adjustments in the ECB's main interest rates.

1.3 Insurance sector

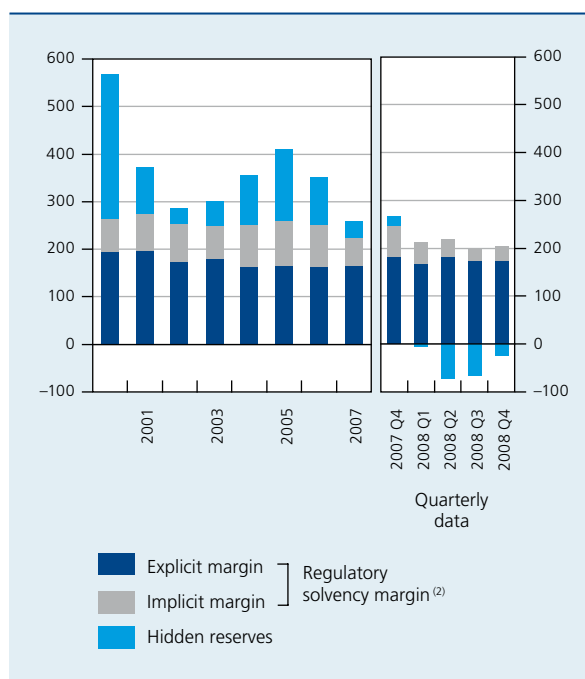
As is evident from the recording of a bottom-line loss of 3.1 billion euro, the crisis on the global financial markets also had a substantial impact on the accounts and the performance of the Belgian insurance sector in 2008. Apart from a decline in life insurance premiums, the deterioration in the overall profitability of the insurance sector essentially reflected the impact of the international financial crisis, which caused a loss of income and writedowns on insurance companies' investments in financial assets. Substantial writedowns were in fact recognised in 2008, in both the life and non-life branches. In the quarterly financial statements, they were reflected in an increase in investment costs. These costs, which include gross impairments and reductions in the market value of positions in financial assets, increased by 7.4 and 1.4 billion euro respectively in the life and non-life technical results in 2008, as compared to the level recorded in 2007. Many of these impairments and valuation losses concerned insurance companies' equity portfolios and several categories of fixed-income instruments, given the stressful market conditions in 2008 and especially during the last quarter of that year. The recognition of large losses on the holdings of financial instruments in the income statement contributed to a decline in the outstanding amount of unrealised losses on the investment portfolio, which declined from 4.8 billion euro at the end of September 2008 to 0.9 billion at the end of the year.

As several insurance companies strengthened their capital base in 2008, the explicit solvency margin of the insurance sector increased by 3.6 billion euro relative to the end of 2007. This allowed the sector to maintain solvency ratios close to 200 p.c. of the minimum required margin, notwithstanding the large bottom-line loss (Chart 3).

Interest rate changes and fluctuations in bond prices are a crucial parameter in the asset and liability management of insurance companies, especially for the life branch. This is *inter alia* due to the characteristics of life insurance contracts with a guaranteed rate of return, under which insurance companies may have to share part of the benefit of higher interest rates with the policyholders, in

CHART 3 SOLVENCY MARGIN OF BELGIAN INSURANCE COMPANIES ⁽¹⁾

(unconsolidated data, percentages of the minimum required margin)



Sources: CBFA, NBB.

(1) The quarterly supervisory data are not entirely comparable with the final annual figures. In particular, they take no account of any redistribution of profits to shareholders and policyholders.

(2) This margin is composed of an explicit margin – including the own funds, subordinated debts and certain other balance sheet items – and an implicit margin which, subject to the approval of the CBFA, comprises certain other specific elements, the principal one being a part of the unrealised gains on investment portfolios.

the form of profit-sharing, while the risk of interest rates falling below the guaranteed minimum is borne entirely by those companies. The level of these guaranteed yields is a particularly significant constraint when interest rates on risk-free assets fall to low levels, as was the case in the final quarter of 2008 and the first months of 2009. In fact, such a development could erode the profitability of some guaranteed yield contracts, as happened a few years ago when the returns which insurance companies achieved on their investment portfolio had fallen well below the statutory ceiling on the minimum guaranteed rate of return, namely 4.75 p.c. up to the end of June 1999 and 3.75 p.c. thereafter. Since then, the sector has gradually rectified this adverse structure by marketing new contracts with clauses and guaranteed yields which are more in line with risk-free interest rates and can also be revised if market conditions change. These measures contributed to a reduction in the average guaranteed interest rate on class 21 contracts, which came down from 4.5 p.c. in 1999 to 3.4 p.c. in 2007 and 3.3 p.c. in 2008.

2. Resilience of financial infrastructure

2.1 Overview of the NBB's oversight activities

The central bank's oversight of payment and settlement infrastructures is motivated by the ultimate policy objective of promoting the global safety and efficiency of these infrastructures. The NBB oversees a wide variety of infrastructures: large value payment systems, securities settlement systems (SSS), central counterparties (CCP), retail payment systems, card schemes, e-money schemes, message providers, card scheme operators. This oversight activity has been developed under a variety of international cooperative arrangements: for SWIFT the NBB is lead overseer with the support of the central banks of the G10; for Euroclear, the NBB cooperates closely with the Belgian prudential supervisor, the CBFA as lead authorities for the oversight/supervision of Euroclear SA; for the oversight of card schemes and TARGET2, specific cooperative arrangements have been set up within the Eurosystem.

The NBB's oversight of SSS remains largely based upon the CPSS-IOSCO recommendations. For the oversight of the Euroclear ICSD system, particular attention has been paid to the standards on credit and liquidity risk, and on risks in cross border links. For the cooperative oversight of Euroclear SA, the monitoring of the implementation of the strategic programmes of the Euroclear group remains one of the priorities of the assessment programme, as commonly agreed by the regulatory authorities.

The oversight of card schemes has entered a new phase in the euro zone, as in January 2008, the Governing Council of the ECB published oversight standards for card schemes. In 2008- 2009, the NBB is in the process of assessing the Belgian national scheme, Bancontact-MisterCash, against these standards, and is leading the assessment group of Eurosystem NCBs in assessing MasterCard Europe against these standards.

For the oversight of SWIFT, the High Level Expectations (HLEs – which are in fact the central banks' oversight standards for SWIFT) have taken a central place in the central banks' activities. The HLEs serve as the basis for self assessment by SWIFT, and provide overseers with a clear and explicit framework for reviewing SWIFT's activities, for setting priorities in the oversight activities, and for structuring the dialogue with SWIFT.

2.2 The assessment of Euroclear Bank (ICSD) against the CPSS-IOSCO Recommendations

In 2001, the Committee on Payment and Settlement Systems (CPSS) of the central banks of the Group of Ten countries and the Technical Committee of the International Organisation of Securities Commissions (IOSCO) published a set of standards: the Recommendations for securities settlement systems. In 2003, the CPSS-IOSCO also developed an assessment methodology. The objective of these recommendations is to contribute to financial stability by strengthening the securities settlement systems that are an important component of the financial markets infrastructure.

As an overseer, the NBB has updated its 2004 assessment of the Euroclear system (the International Central Securities Depository operated by Euroclear Bank) against the CPSS-IOSCO recommendations. Euroclear Bank is a wholly-owned subsidiary of the Euroclear holding company, ESA. The Euroclear system settles a wide range of instruments: eurobonds, international bonds, domestic bonds, equities, and other instruments, in over 50 currencies. The assessment results show that the system is fully compliant with sixteen recommendations, whereas for one recommendation (Recommendation 19 on risks in cross border links), the Euroclear system is considered compliant except for one link. Two recommendations were considered not relevant for Euroclear, as they deal with aspects (trade confirmation, settlement cycle) for which Euroclear bears no responsibility.

2.3 A central counterparty solution for credit default swaps

Credit default swaps (CDS) make it possible to isolate the credit risk on a reference entity and transfer it to the party selling protection. CDS markets are one of the main channels through which credit risks are transferred, and their good functioning is a key component of financial stability. The counterparty and operational risks on CDS have become a major source of concern since the financial crisis. In recent months, the creation of a central counterparty (CCP) for CDS has received wide support and two CCPs have started clearing credit default swaps. This article highlights the benefits to be expected from a CCP in reducing counterparty and operational risks in CDS processing.

In recent years, the markets have already developed various initiatives, either on a bilateral or on a multilateral basis, to manage these risks. Operational risk has been coped with via the harmonisation of the CDS coupon value dates, the introduction of a uniform procedure in

case of the default of the CDS reference entity, or the use of a datawarehouse for the central recording of CDS trades. Counterparty risk management comprises the bilateral collateralisation of CDS positions, the use of prime brokerage services for CDS clearing (whereby the prime broker acts as a kind of mini-CCP between its clients and their dealers), or the use of portfolio compression services for CDS.

The use of a CCP can be seen as a logical follow-on to these arrangements. By adopting a CCP solution, counterparties to a CDS will not only set off their contracts but also standardise the counterparty risk they incur, because all claims and obligations will be on the CCP. For the authorities and the private sector alike, a CCP has the potential to enhance post-trade processing and to reduce systemic risk, provided it has adequate and robust risk management practices. An additional public sector concern relates to the location of the CCP, which should guarantee sufficient influence for the relevant regulator and supervisor or overseer of the CCP.

Depending on market participants' choices, global or regional solutions will become successful. How the evolving CCP model for CDSs will look depends, among other things, on the extent to which not only indices but also single-name CDSs are cleared, on how CCP membership criteria are set, and on the role of the datawarehouse.

3. Thematic articles

3.1 Extreme events and financial system governance: some lessons from the crisis

The catastrophic consequences of the current crisis have put tremendous pressure on financial policymakers to take measures to minimise the likelihood of such crises in the future. In this context, it is important to understand more about the nature of crises, or extreme events in risk managers' parlance. Extreme events in the financial system exhibit certain characteristics; the way they propagate through the financial system depends on the interdependencies between and complexities of financial institutions; they often arise endogenously from within the system; they occur very infrequently; and they often generate high costs which must be borne by a broad range of market participants. Hence, extreme events in the financial system have a clear systemic dimension.

This article explores some factors that may underlie a build-up of risk in financial institutions and the system. One factor relates to the weaknesses of risk models and

the difficulty to capture the systemic complexities and interdependencies within the financial system. Another factor concerns the inadequate incentives for financial institutions to invest in preventing extreme events. The failure of an individual financial institution can have an impact on the entire financial system; however, financial institutions do not "internalise" the negative externality they impose on other financial system participants and the wider economy when making decisions related to their robustness.

These factors suggest the need for incorporating the systemic dimension more fully in financial regulation, and for improving institutions' incentives to engage in adequate risk management. Several current policy proposals are considered in this light. Proposals to establish a systemic risk regulator (macro-prudential supervisor), to regulate the "shadow" banking system (e.g. hedge funds), and to apply specific measures to systemically important institutions reflect concerns about systemic risk. Proposals aimed at reducing the pro-cyclicality of the behaviour of financial institutions address both the incentive problem and concerns about systemic risk. Proposals for improving corporate governance aim at incentives to invest in robustness.

3.2 Reforming remuneration schemes in the financial industry: some governance and implementation issues

Remuneration schemes in financial institutions are at the heart of the current debate on how to restore financial stability. Those schemes are believed to have contributed to excessive risk-taking in financial institutions.

Remuneration has traditionally been viewed, for non-financial and financial firms alike, as a mechanism for aligning the interests of managers with those of the firm's shareholders. However, aligning the interests of these two groups also involves aligning their risk appetites. Given the potential impact on the economy of risk-taking in financial institutions, it is important to understand the link between compensation and risk-taking. One should also ask whose risk appetite remuneration schemes in financial institutions should reflect. For instance, the level of risk taken in some institutions prior to the crisis may have been consistent with shareholders' risk appetites, but "excessive" from the regulator's or the social point of view.

Another feature of financial institutions is that non-executive employees (traders, senior employees in investment banking, etc.) may earn more than executives, through higher bonuses. To date, corporate governance codes and regulations have focused mainly on the remuneration of

executives. Disclosure relating to non-executive employees' remuneration is generally not required and not provided by financial institutions. However, the remuneration schemes for certain non-executives can have a significant impact on the institution's risk-taking. This suggests that proposals relating to the design and disclosure of remuneration in financial institutions need to apply to all levels of the organisation.

Finally, some current proposals call for linking remuneration schemes to measures of risk. However, reliance on imperfect risk measures may be ineffective and, more importantly, may create arbitrage-like opportunities for taking on risk unrecognised by the measures. Adjusting remuneration for risk, while desirable in principle, may be quite difficult to achieve in practice.

3.3 What determines euro area bank CDS spreads?

In recent years, market participants and regulators alike have begun to look to bank credit default swap (CDS) spreads as indicators of bank credit risk. Bank CDS spreads are regularly cited in central banks' Financial Stability Reviews, and they have been incorporated in recent regulatory initiatives to deal with "toxic" assets on banks' balance sheets. However, little is known about the

determinants of these spreads. Furthermore, the considerable increase in bank CDS spreads observed since mid-2007 (up by several hundred basis points for some banks) raises the question as to what extent credit risk accounts for much or all of the changes.

This article presents an empirical analysis of the determinants of CDS spread changes on euro area banks before and after the start of the crisis. In addition to variables suggested by structural credit risk models and a variable reflecting CDS market liquidity, variables reflecting general economic conditions (which could potentially capture factors such as systematic credit risk or risk aversion) are also used to explain changes in CDS premia.

The analysis reveals three main results. First, the determinants of changes in bank CDS spreads exhibit significant time variation. Second, variables suggested by structural credit risk models are not significant in explaining bank CDS spread changes, either in the period prior to the crisis or in the crisis period itself. However, some of the variables proxying for general economic conditions are significant, but the magnitude of their coefficient estimates and their sign have changed over time. Third, CDS market liquidity became a significant factor in explaining bank CDS spread changes when the crisis broke out in the summer of 2007.

Financial Stability Overview

1. Operating environment

The decision of the US authorities, in the weekend of 13 and 14 September 2008, not to bail out Lehman Brothers – the fourth largest US investment bank – proved to be a major turning point in the global financial crisis. It afflicted an already fragile financial system, having recognised at that point in time already more than 500 billion US dollar of writedowns on financial assets. Funding liquidity conditions on interbank and other wholesale money markets had moreover been tight during the 12 months preceding the failure of Lehman Brothers, in response to the revelation, in the summer of 2007, of a number of substantial flaws in the “originate and distribute” credit intermediation model, through which increasing amounts of newly originated debt had been redistributed to final investors since 2000. These deficiencies were highlighted by the higher than expected delinquencies on recent vintages of US subprime mortgage loans.

One of the flaws related to the incomplete mitigation and management of some agency problems and incentive misalignments between various participants in this fragmented and market-oriented business model for intermediating credit between savers and borrowers, which had contributed to an excessive weakening of credit standards in the origination of subprime mortgage loans in the US.

The second lesson pertained to the vulnerability of a financial system that relied very heavily on the expert opinion of rating agencies for the distribution and subsequent pricing of newly securitised loans. Many investors had overlooked the inherent limited scope of debt ratings (focused only on credit risk) and the previously well-flagged – but apparently less well appreciated – specific features and risks of ratings of structured finance instruments, such as their high sensitivity to assumptions about default correlations in the underlying pool of loans.

Yet the weakness in the “originate and distribute” system that arguably contributed the most to the severe dislocations in broader credit and funding markets was the fact that a substantial share of the investments in highly-rated tranches of securitised and structured finance instruments had been financed with large amounts of short-term debt originated in the wholesale money markets, be it in the form of short-term (often overnight) repo transactions, asset-backed commercial paper, or other short-term financing instruments (Chart 1). The associated build-up of large maturity mismatches and significant exposures to funding liquidity risk in the “shadow banking system” – composed of securities firms, commercial banks’ trading books, hedge funds and off-balance sheet financing vehicles such as ABCP conduits or Structured Investment Vehicles – was the main vulnerability through which the shock in a sub-segment of the US mortgage market could bring about a deleveraging process that proved difficult to contain. Faced with a structural repricing of funding liquidity after the summer of 2007, in the form of higher haircuts in secured financing transactions for example, many balance sheets experienced significant funding pressures and tried to delever.

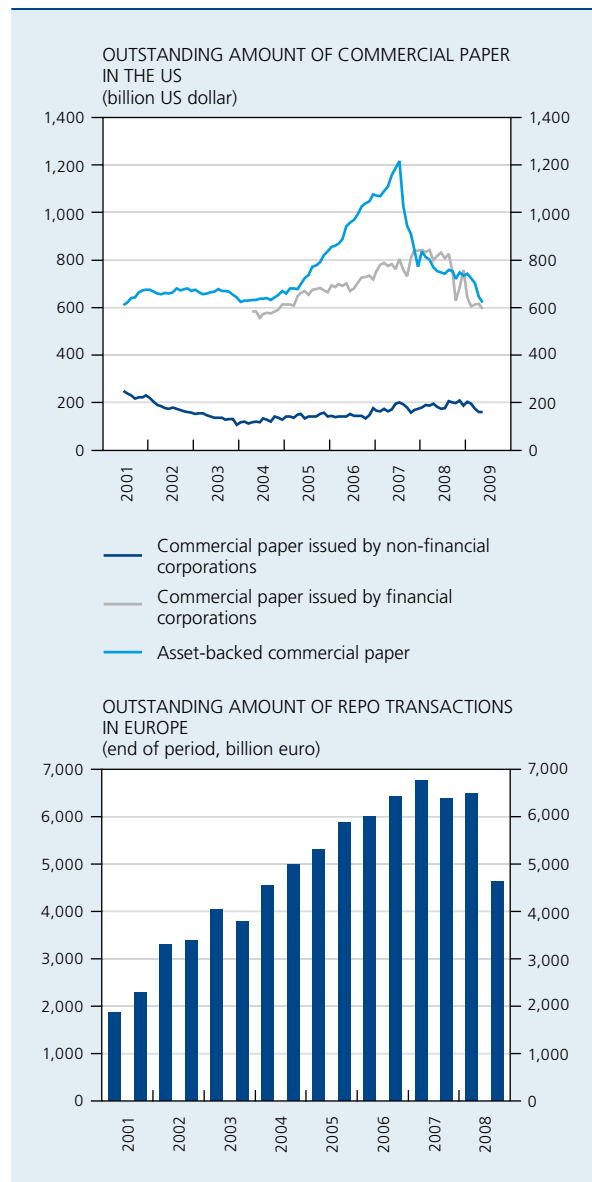
The resulting overhang of highly-rated debt securities in many markets undermined the secondary market liquidity for these securities and depressed their prices to “fire sale” levels, i.e. well below what would appear to be a fair price on the basis of the underlying cash flows. Due to drawings on their committed credit lines or other forms of support for off-balance-sheet investment vehicles, some banks also had to cope in these circumstances with an unexpected expansion of their balance sheet. This laid claim on their liquidity and capital reserves, at a time when the seizure of primary securitisation markets prevented them from loading off loans in the capital markets.

The failure of Lehman Brothers on 15 September 2008 magnified these funding liquidity tensions on the interbank and wholesale money markets to a significant degree, as highlighted in Chart 2. Marking a sharp contrast with the government-facilitated takeover of investment bank Bear Stearns in March 2008, the decision to let Lehman Brothers fail represented for financial markets a generally unanticipated materialisation of counterparty risk in the case of a bank deemed “too big to fail”. The effects of this failure spread throughout the system via various transmission channels, both direct and indirect, contributing towards a sudden evaporation of liquidity on key secured and unsecured funding markets for financial institutions.

The first of the direct channels concerned financial transactions in which Lehman Brothers was the debtor or counterparty. As a big investment bank and one of the world’s leading financial brokers, Lehman Brothers had extended its operations to a wide variety of markets, so that its default impacted a large number of transactions with other financial institutions across the world. In particular, the central position of Lehman Brothers on private, over the counter (OTC), markets in derivatives, principally the credit derivatives market, was a source of serious concern for the financial markets, in view of the specific characteristics of those markets where contracts are traded bilaterally without the intervention of a stock exchange or central counterparty to cover the credit risks. As no one could be sure of the orderly unwinding of all the transactions concluded with Lehman Brothers, uneasiness about the real liquidity needs of many financial institutions and their actual ability to cover additional needs in extremely tense markets led to liquidity hoarding, placing a great strain on the operation of the wholesale money markets.

The failure of Lehman Brothers, followed a few days later by the default on the senior debt of the sixth largest American commercial bank, Washington Mutual, produced a second direct effect which proved even more damaging, via the heavy losses which it caused for its main creditors. As the investment bank had issued considerable volumes of commercial paper and other short-term instruments to raise finance, many American money market funds were exposed to a credit risk on this institution. Despite the crisis, the outstanding amount of assets managed by those money market funds had reached a record 3500 billion US dollar in August 2008, as investors considered these investments to be particularly secure owing to the undertaking given by these funds never to repay less than the amount initially put in. While a number of funds were covered by their managers and sponsoring banks in respect of the substantial losses which they incurred on their investments in Lehman Brothers securities, one of those funds, Primary Reserve,

CHART 1 WHOLESALE MONEY MARKETS



Sources : International Capital Market Association, Federal Reserve, Thomson Financial Datastream.

had to announce on 16 September that its net asset value had fallen below par, becoming the first money market fund to get into such a situation in fourteen years. The shock waves triggered by this news led to massive withdrawals from money market funds invested in commercial paper issued by financial corporations, adding to the financial pressures on those institutions in markets which were already very tense. Maturities shortened and interest rates surged, while the outstanding amount of commercial paper in the United States shrank by over 360 billion dollars, from a figure of around 1810 billion recorded on 12 September.

CHART 2 SPREAD BETWEEN THE THREE-MONTH EURIBOR AND OVERNIGHT INDEX SWAP ⁽¹⁾
(percentages)



Source: Thomson Financial Datastream.

(1) Fixed rate paid by the counterparty of an interest rate swap receiving the overnight Eonia rate for a three-month term.

With banks no longer willing to provide financing to other banks, even on an overnight basis, due to perceived counterparty risks, the global money markets became completely dislocated in the days following the default of Lehman Brothers. The yield on three-month US Treasury Bills, considered to be a prime risk-free asset, plunged to virtually 0 p.c., while other money market rates, such as the LIBOR, remained unusually high. More important than the increasing cost of funding for financial institutions, however, was the rationing of funding volumes in key segments of wholesale funding markets, including in Europe. The volume of lending declined dramatically, even on guaranteed markets where loans are covered by the pledge of securities as collateral in favour of the creditor. Some collateral categories were no longer accepted, in view of their plummeting prices, while banks with excess liquidity simply did not wish to lend it to other market counterparties any longer. Consequently, the volume of trading on the repo market, which had become a key component of the wholesale financing of financial institutions, declined, impeding the regular flow of funds which had previously taken place between institutions with a liquidity surplus and those with a deficit.

This interruption in the intermediation process was even more pronounced on the unsecured markets, where the supply evaporated completely for terms longer than overnight, and remained well short of demand for the latter, as highlighted by the spikes in the overnight interbank rates in the US and Europe in the second half of September and the first half of October. Strong demand for financing in

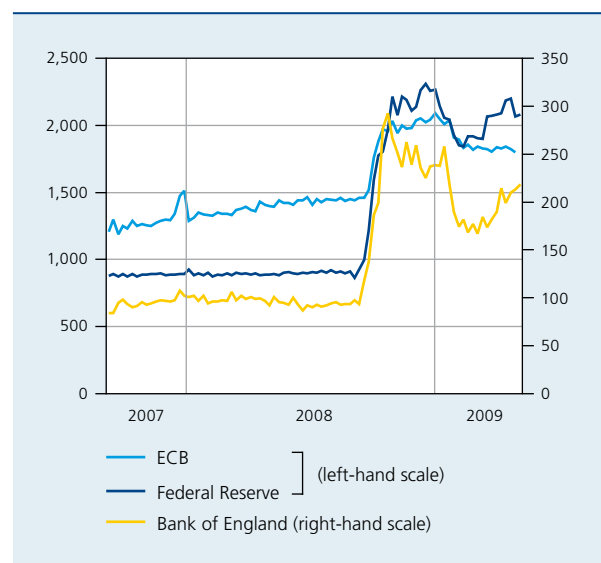
dollar exacerbated the pressures on the overnight rates in US dollar during European market trading hours.

Massive support interventions from central banks and governments were necessary to prevent a contagious materialisation of counterparty risks and disorderly balance sheet liquidations in the global financial system in these circumstances.

According to estimates by IMF Staff, governments and central banks in the advanced economies had put in place by 15 April 2009 support measures for their financial systems for a total headline amount of almost 50 p.c. of their GDP. The bulk of these consisted of enhanced liquidity provision and other support measures by central banks (18.8 p.c. of GDP) and guarantees on financial institutions' assets or liabilities (22.8 p.c.). Capital injections (2.9 p.c.) and other forms of support (5.3 p.c.), including asset purchases, account for the rest of the total. These amounts do not include the financial support programmes that the IMF, in co-operation with the EU Commission and other institutions, had to establish for several European economies (including Iceland, Hungary, Ukraine and Romania) that were hit by a significant tightening of their external funding in the presence of important domestic and external imbalances.

Central banks have cut policy rates sharply after the failure of Lehman Brothers and, as lenders of last resort, expanded their balance sheets to accommodate, in part at least, the increased financing needs of the bank and non-bank financial sector (Chart 3).

CHART 3 CENTRAL BANK ASSETS
(billion of domestic currency)



Sources: Bank of England, ECB and Federal Reserve.

Changes were made to the Eurosystem's liquidity management framework in order to enhance banks' access to central bank liquidity. These included an enlargement of the collateral framework for the Eurosystem's credit operations, the enhancement of its refinancing operations with the introduction of three and six-month long-term refinancing operations with a fixed rate and full allotment, and the use of reciprocal currency arrangements (swap lines) with the Federal Reserve to provide US dollar funding against collateral eligible in the Eurosystem. In May 2009, the Governing Council decided to proceed with its enhanced credit support approach by announcing an extension of the maturity of liquidity-providing longer-term refinancing operations to 12 months. These operations, which will start in June 2009, will be conducted as fixed rate tender procedures with full allotment. The Governing Council also decided in principle that the Eurosystem will purchase euro-denominated covered bonds issued in the euro area.

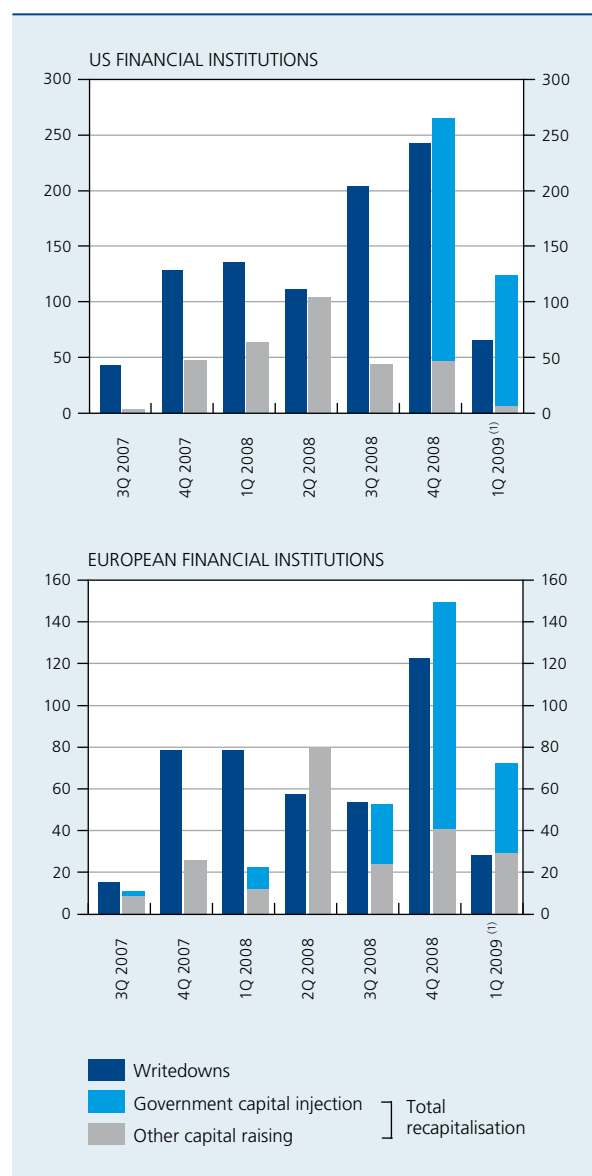
Given the importance of market financing in the US, the Federal Reserve, in addition to the enhanced provision of short-term liquidity to banks, also started to extend liquidity directly to borrowers and investors in key credit markets, by setting up various facilities aimed *inter alia* at the (re)financing of commercial paper or the primary market for consumer loan related asset-backed securities. The US central bank also expanded its traditional tool of open market operations, announcing on 18 March plans to purchase up to 300 billion US dollar of longer-term Treasury securities in addition to increasing its total purchases of debt issued by the government-sponsored mortgage agencies and mortgage-backed securities to up to 200 billion US dollar and 1250 billion US dollar, respectively.

While contributing undoubtedly to the observed easing of tensions on the interbank market since December 2008 (Chart 2), these central bank measures in itself were not sufficient to pull back the global financial system from the brink it was facing in the immediate aftermath of the Lehman Brothers failure. The implications of this event indeed far exceeded the direct effects on key funding markets for financial institutions described above, as it occurred in a context of increased market concerns over the ability for key intermediaries to cope on their own with the essential balance sheet restructuring needs resulting from the international financial crisis and the forces of deleveraging. These heightened counterparty risk concerns over financial institutions not only led to large increases in CDS premiums referencing key intermediaries, but also started to disrupt the normal functioning of key financial markets. Barely a week before the Lehman Brothers failure, the US government-sponsored mortgage agencies Fannie Mae and Freddie Mac had had to be rescued by US

Treasury commitments of up to 100 billion US dollar for each of the two institutions concerned. And at around the same time of the Lehman Brothers difficulties, the world's largest insurer, AIG, was desperately searching for funds to cover 18 billion US dollar in additional collateral required by its entity specialising in financial products.

In order to stabilise the global financial system in these tense conditions, governments had to complement the central bank interventions with several extensive other

CHART 4 FINANCIAL INSTITUTIONS' ASSET WRITEDOWNS AND RECAPITALISATIONS
(billion US dollar)



Source: Bloomberg.

(1) The figure for writedowns in the first quarter of 2009 is partial, since a number of institutions had not yet published their results for that quarter as at the cut-off date for the finalisation of this chart.

support measures. These measures included the expansion of deposit insurance schemes, guarantees for bank liabilities, the provision of insurance schemes or asset purchase programmes to relieve banks from strongly devalued or non-performing assets and government capital injections. Excluding the enhanced liquidity provision and other support measures by central banks (18.8 p.c. of GDP), these measures represented a headline amount of 31 p.c. of the advanced economies' GDP by mid April 2009. Even though the upfront government financing needs (estimated by the IMF at about 3.5 p.c. of GDP) were only a fraction of these large (notional) contingent liabilities, they contributed, together with widening fiscal deficits, to a significant increase of CDS premiums for sovereign borrowers.

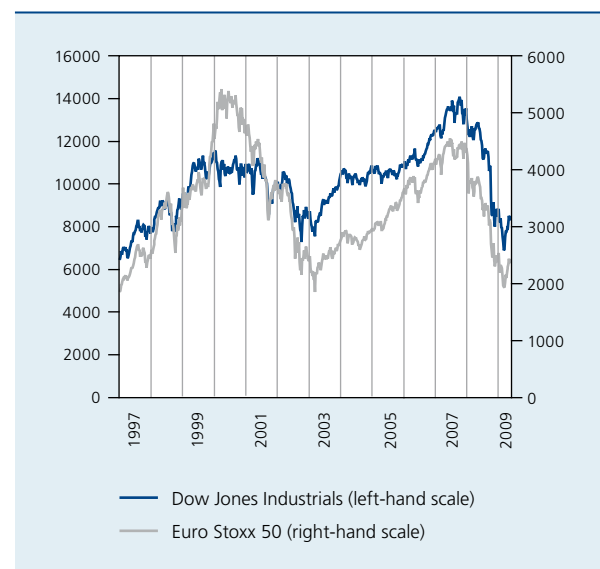
After the failure of Lehman Brothers, for many financial institutions in the US and Europe, government capital injections had become the only available means to compensate large ongoing losses and to meet market analysts' calls for higher core capital levels at credit institutions, as a buffer against future losses (Chart 4). After several quarters of large writedowns on financial assets, analysts' focus on the quality of bank capital had indeed intensified. Markets increasingly focused on tangible common equity, as broader measures of capital, such as Tier I, were by the third quarter of 2008 seen by investors as offering insufficient protection and as a less reliable basis for investor valuation and counterparty assessment. Yet, with writedowns mounting, this common equity was being depleted, reducing its share in total capital relative to other components with weaker loss-absorbing characteristics. By mid May, more than 1450 billion US dollar of cumulative losses had been recognised in the global financial system since the third quarter of 2007. According to the data collected by Bloomberg, the US and European governments had injected by then respectively 335 and 192 billion US dollar of capital in their financial institutions. Together with the cumulative capital raised from private sources, these government capital injections in Europe covered the cumulative amount of writedowns by then (435 billion US dollar versus 414 billion of total capital raised). For US financial institutions, the comparative figures were 930 billion US dollar and 647 billion US dollar respectively.

Forward-looking estimates of total losses on securities and loans to be recognised by the global financial system generally conclude that loss recognition is incomplete. One of these are the projections by the IMF in its latest Global Financial Stability Report (April 2009). According to these estimates, the potential pipeline losses still to be recognised by banks in the US, the euro area and the UK are respectively 550, 750 and 200 billion US dollar, or 250, 150 and 25 billion US dollar if account is taken of expected net earnings in 2009 and 2010.

Large (prospective) losses for the US and European banking system have contributed to a significant tightening of lending standards and the development of a negative feedback loop between the difficulties in the financial sector and deteriorating economic conditions. This negative feedback loop was particularly strongly felt in countries where earlier credit-fuelled economic growth had gone hand in hand with deteriorating internal and external balances, such as in Ireland or a number of Central and Eastern European countries. As a result of the severe and highly synchronised deceleration of economic activity across the globe in the last quarter of 2008 and the first quarter of 2009, the IMF expects a contraction of global economic output by 1.3 p.c. in 2009. This represents the deepest post-World War II recession and it will affect the performance of both the advanced and emerging market economies significantly. Box 1 discusses in more detail the mechanisms in the financial sector that served to amplify the business cycle and the measures that could help to mitigate this procyclicality.

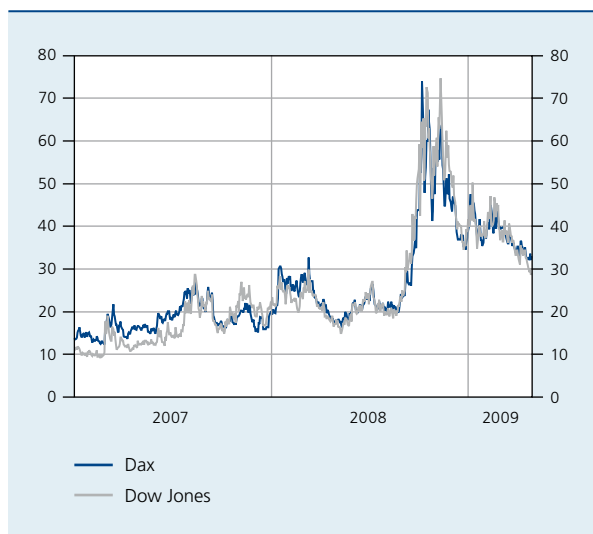
Market anticipations that the events following the failure of Lehman Brothers would fuel a strongly negative feedback loop between the financial sector and the real economy contributed in the autumn of 2008 to unprecedented falls in asset prices. Equity market indices thus saw their losses accelerate after mid September, with indices plummeting by 20 p.c. or more during the week of 6 October, driving down price-earnings ratios in both the United States and the euro area well below their historical levels (Chart 5).

CHART 5 STOCK MARKET INDICES



Source: Thomson Financial Datastream.

CHART 6 IMPLIED VOLATILITY OF OPTIONS ON STOCK MARKET INDICES
(percentages)



Source : Thomson Financial Datastream.

The acute uncertainty over future corporate profits was also reflected in a sudden rise in market expectations concerning stock market volatility (Chart 6). The implicit volatility indices climbed to levels well in excess of the records reached at the time of the bursting of the new information and communication technologies (ICT) bubble in the early 2000s, and even exceeded those at the time of the 1987 stock market crash. These indices have remained quite high, bearing witness to the persistent uncertainty over corporate profit developments and risk aversion prevailing among investors.

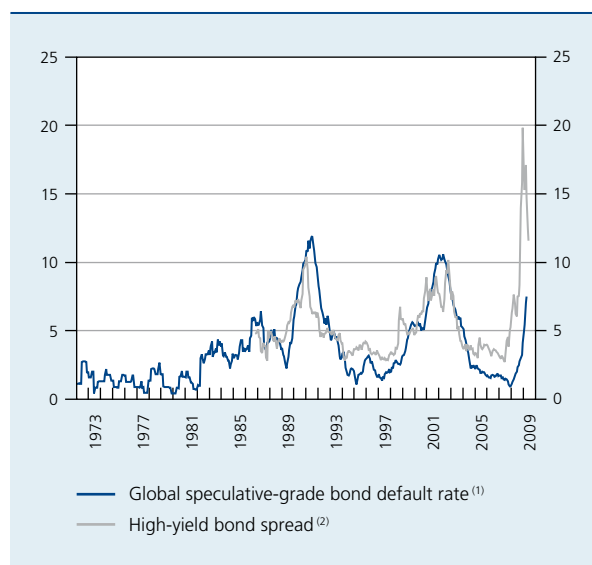
Dramatic increases in risk premiums were also recorded on the markets in fixed-income securities, including investment-grade bonds, which saw price falls almost equalling those for speculative-grade bonds. Thus, prices of bonds issued by banks with an A rating, or AAA tranches of bonds backed by commercial mortgage loans, slumped by over 10 p.c. in the period following the failure of Lehman Brothers. The yield differential between speculative-grade bonds in dollar and US government securities jumped to over 19 p.c., almost double the spread seen in earlier periods of stress and rising defaults (Chart 7).

Even though the risk premiums shown in Charts 6 and 7 have declined from the stressed levels recorded in the second half of 2008 and the first quarter of 2009, their levels remain consistent with market expectations of substantial financial stress in the non-financial private

sector in the forthcoming period and potentially substantial losses for creditors. Following the high levels of writedowns which were mainly concentrated on investments in structured securities, the global financial system will thus have to cope with a second wave of materialising risk, now concentrated on losses in the more traditional loan books. The global speculative-grade bond default rate has risen from less than 1 p.c. at the end of 2007 to 7.5 p.c. in April 2009, and is forecast, by the major rating agencies, to exceed in the course of 2009 and 2010 the previous peak reached in May 2002 of 10.6 p.c. Losses on defaulted bonds for both secured and unsecured creditors have reportedly also been magnified by lower than average recovery rates.

As the substantial decline of economic growth in recent quarters has led to downward pressures on corporate profits and cash flows, various forward-looking credit indicators, such as rating downgrade-to-upgrade ratios, suggest that the credit cycle downturn will be broad-based and protracted, challenging as well the financial strength of investment-grade corporations. In this connection, it can be recalled that the effective materialisation of credit risks in the form of defaults and credit losses typically follows economic growth developments with some lag.

CHART 7 INTEREST RATE SPREAD AND DEFAULT RATE ON HIGH-YIELD BONDS
(percentages)



Sources: Moody's, Thomson Financial Datastream.

(1) Number of bonds with a rating below Baa3 recording a default in the previous twelve months, expressed as a percentage of the total number of bonds with the same rating.

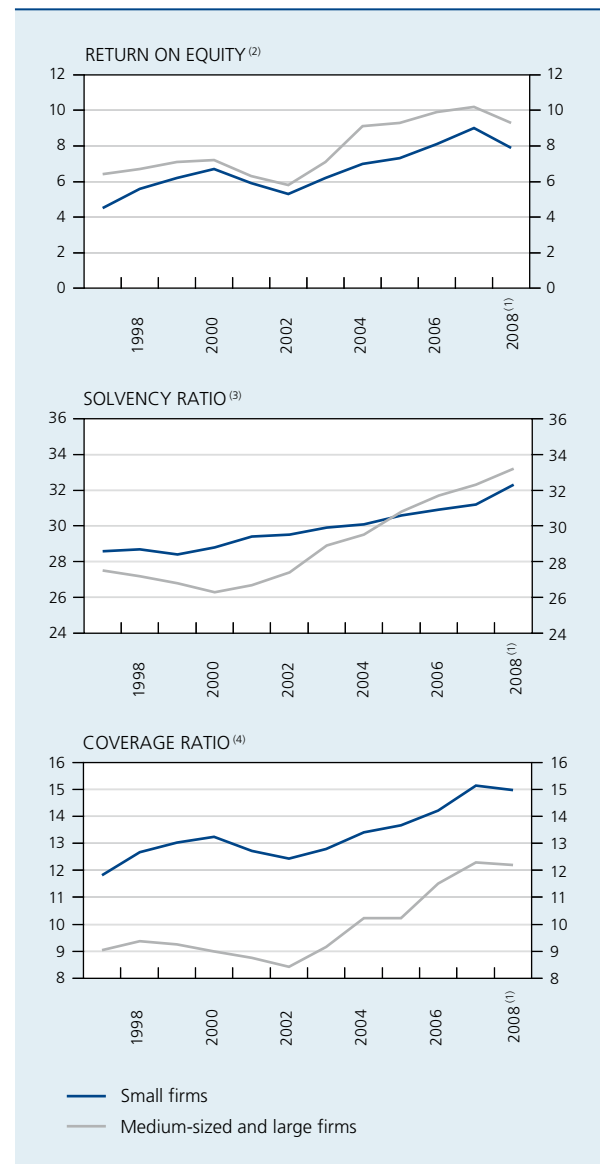
(2) Difference between the interest rate on ten-year US Treasury bonds and the yield on corporate bonds denominated in US dollar with a rating below BBB/Baa3.

With a rise of almost 25 p.c. relative to the same period of 2008, the development in the number of bankruptcies in Belgium during the first four months of 2009 confirms that the Belgian corporate debtors have not been immune to the deterioration that has taken place in the global economic situation. This development occurred in spite of the further improvement that has taken place in the median solvency ratio for a sample of non-financial corporations for which annual accounts for 2008 were already available in the Central Balance Sheet Register (Chart 8). This measure of own funds as a percentage of the balance sheet total is estimated to have risen to respectively 32.3 p.c. and 33.2 p.c. for the small firms and the medium-sized and large firms last year. This follows the introduction, in 2006, of a more favourable fiscal regime for own funds.⁽¹⁾ The increase in the outstanding amount of own funds is also the main explanation for the decline in the median return on equity, as the level of profits for the sample of non-financial corporations used for the projections levelled out, instead of declining. The latter partly reflects the fact that a large number of companies in the sample have an accounting year that does not coincide with a calendar year, so that their 2008 accounts did not reflect entirely the significant economic deterioration that took place in the second half of 2008. Even if the data shown in Chart 8 thus give a somewhat biased view of the impact of the deteriorating economic conditions in 2008 on the Belgian non-financial corporate sector, the extent to which debts and provisions are covered by cash flows already appears to have peaked in 2007. While this coverage ratio remains at a substantially higher level than in 2002 and 2003, when the previous credit cycle downturn occurred, it could come under pressure as the full extent of the economic crisis is reflected in the profits and cash flows of the sector. At about 70 p.c. of GDP at the end of 2008, the overall indebtedness of the non-financial corporations in Belgium was about 10 p.c. of GDP lower than the equivalent ratio for the euro area.

The growth of corporate loans from resident banks – which provide around three-quarters of all corporate bank debts – has declined from more than 15 p.c. on an annual basis in the beginning of 2008 to less than 5 p.c. at the end of the first quarter of 2009. This deceleration in net bank lending to Belgian non-financial corporations occurred in spite of a higher use of credit lines, in particular by the medium-sized corporations. Results of the Belgian bank lending survey show in this regard that the financial crisis, started in August 2007, occurred in a context of strong corporate demand for credit. They also

(1) For a more detailed description of the two measures introduced in 2006 to ensure a more equal tax treatment between debt financing and equity financing, see FSR 2006, Box 2, 33-35.

CHART 8 MEDIAN PROFITABILITY AND SOLVENCY INDICATORS FOR BELGIAN NON-FINANCIAL CORPORATIONS⁽¹⁾



Source : NBB.

(1) The medians in 2008 are calculated by applying to the 2007 medians the percentage of variation observed in a constant sample of early reporters in the Central Balance Sheet Register. A company is considered to be small when it submits its annual accounts to the Central Balance Sheet Register in accordance with the abbreviated reporting scheme. Medium-sized and large companies report in accordance with the full scheme.

(2) The return on equity is the ratio between the net after tax result and capital and reserves.

(3) The solvency ratio is defined as own funds divided by the balance sheet total.

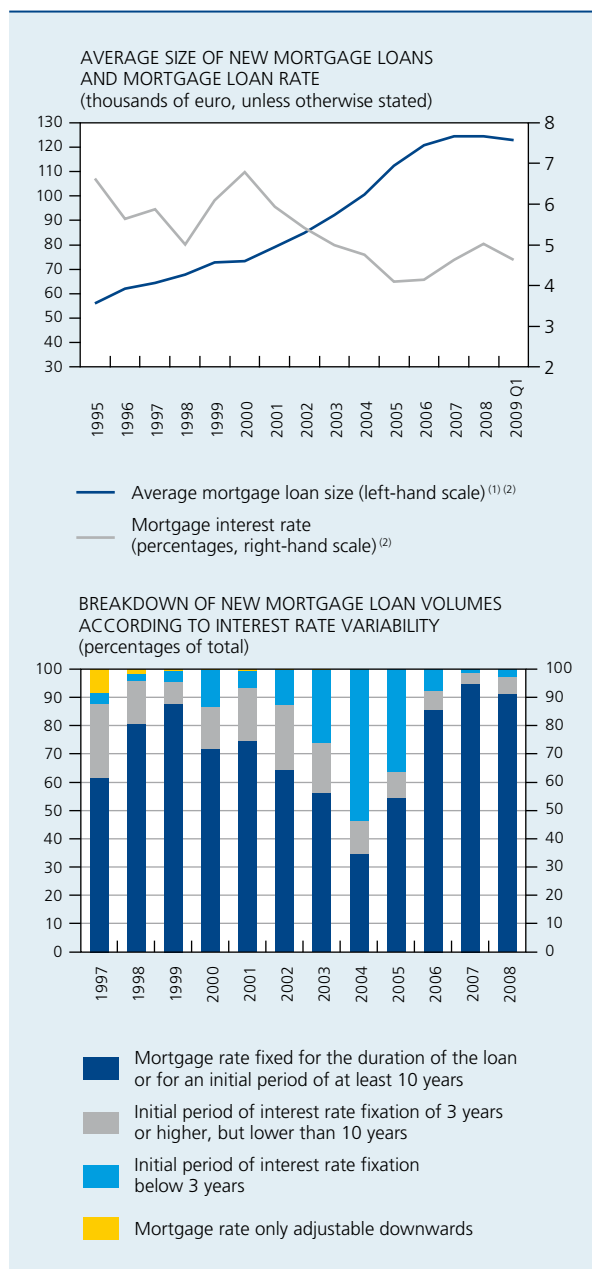
(4) The coverage ratio is calculated by dividing the cash flows by the sum of debts and provisions.

suggest that the deceleration since then can be attributed to both supply and demand factors. Demand for corporate loans continued to rise until the end of 2007, driven by gross fixed capital formation and by the financing of stocks and working capital. It was not until the first quarter of 2008 that banks reported the first signs

of a slowdown in demand for loans, which was accentuated in the next quarter, and then very strongly at the end of the year. Initially, it was mainly large firms that cut their demand for credit, particularly their requests for long-term loans. In the final quarter of 2008, the fall in demand for credit extended to SMEs and short-term loans. The slowdown in bank loans to corporations also reflected a tightening of lending criteria, however, which

appears to have started already in the third quarter of 2007. The supply of credit was first tightened more in the case of large firms and long-term loans, mirroring the trend in loan demand. From the third quarter of 2008, the tightening of lending criteria spread to SMEs and short-term loans. In the first quarter of 2009, a further tightening of credit standards for corporate loans reportedly took place, albeit to a smaller degree than in the last quarter of 2008.

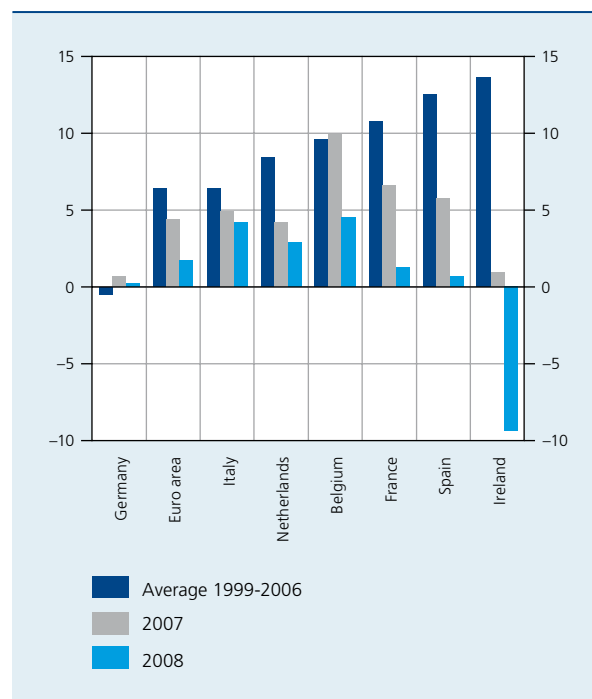
CHART 9 MORTGAGE MARKET DEVELOPMENTS IN BELGIUM



Sources: UPC, NBB.
(1) Mortgage loans for the purchase of an existing house.
(2) Annual averages.

Bank lending to households also slowed in 2008, with a 3.3 p.c. decline in the gross flow of new mortgage loans for the purchase of an existing house, relative to the level recorded in 2007. This decline mainly reflected a fall in the number of new mortgage loans, as the average size of new mortgage loans remained constant at 124.5 thousand euro (Chart 9). This average size of new mortgage loans has been broadly stable since 2006, when an increase in mortgage interest rates appears to have stopped the trend towards higher amounts of individual mortgage loans. The latter development was not only driven by the strong decline in mortgage interest rates that took place between 2000 and 2005, but also by a lengthening of the average maturity of new mortgage loans, in line

CHART 10 NOMINAL HOUSE PRICE DEVELOPMENTS IN THE EURO AREA
(annual percentage changes)



Sources: ECB, Stadim, NBB.

with the introduction of loans with longer maturities on the Belgian mortgage market. At the margin, the increasing popularity of variable rate mortgages (with low initial interest rates) during this period may also have contributed, as the subsequent stabilisation of the average size of new mortgage loans was associated with a shift back to the traditional preference for mortgage loans with a mortgage rate fixed for the duration of the loan or for an initial period of at least 10 years. Yet, the strong momentum that has characterised the Belgian mortgage and residential real estate market in recent years appears to have slowed down significantly in the second half of last year, contributing

to a marginal decline in the average size of new mortgage loans in the first quarter of this year – in spite of a new decline in mortgage loan rates – and a slowdown in the rate of house price inflation to 4.5 p.c. (Chart 10). Although the pace of house price inflation in Belgium thus slowed significantly in the course of 2008, the adjustments taking place in some other euro area countries after several years of double digit house price inflation were even more pronounced (Ireland, Spain, France). In several Central and Eastern European countries, adverse exchange rate movements also contributed to adjustments in the housing markets, given the presence of mortgage loans in foreign currency.

Box 1 – Procyclicality

It has long been observed that the behaviour of financial institutions and market participants tends to fluctuate with the business cycle. For example, during favourable periods, collateral values increase, risk appetites increase, and banks relax their lending standards. In downturns banks experience loan losses, they face increased capital requirements, and they contract their lending. These cyclical patterns in lending can accentuate the business cycle. Mechanisms in the financial sector that serve to amplify the business cycle are referred to as procyclicality.

Many have argued that recent developments in the financial system have heightened procyclicality, and consequently, increased the severity of the current crisis. These developments include the adoption by financial institutions of the “originate to distribute” business model, which significantly broadened reliance on traded assets and especially structured products; the increased use of leverage; and greater dependence on funding with a maturity mismatch. In addition, changes in the regulatory and accounting framework, such as the increased risk sensitivity of regulatory capital requirements in the Basel II framework and the implementation of fair value accounting, are likely to have resulted in increased cyclicity of capital requirements and asset values. However, the extent to which these measures may have contributed to procyclical behaviour has not yet been determined.

Most observers argue that one of the necessary responses to the crisis is to develop measures to mitigate procyclicality, and that such measures will be integral to strengthening the macroprudential dimension of financial supervision.⁽¹⁾ Three areas in which policy proposals are currently being formulated include bank capital, loan provisions, and supplementary risk measures.

Bank capital. Procyclical behaviour on the part of financial institutions could potentially be dampened if sufficient capital “buffers” (i.e., amounts of capital that exceed the minimum regulatory requirement) were built up in favourable periods and drawn down in downturns. Cyclical capital buffers could be constructed in any number of ways. One possibility would be to tie the size of the buffer to macroeconomic indicators or to a stock price index. More favourable macroeconomic indicators would lead to a higher buffer. Another possibility would be to link the buffer with a measure of an institution’s revenue or credit growth. Still another option would be to link capital buffers for different portfolios to the difference between current default rates and “downturn” default probabilities for those portfolios. The lower the current default rate relative to the downturn default probability, the greater would be the buffer.

(1) See, for example, the Report of the Financial Stability Forum on Addressing Procyclicality in the Financial System, April 2009.



A necessary condition for any of these methods to be effective would be for market participants to allow financial institutions to draw down their buffers in downturns. If markets treat the buffers as new minimum levels of capital, then the buffers will not help to diminish procyclical behaviour in periods of stress.

Loan provisions. Loan provisioning techniques can be used that resemble those for building a capital buffer. For example, loan provisions could increase during periods of credit growth, creating extra reserves that could be drawn upon in periods of rising loan defaults. Dynamic provisioning is a technique which consists in setting aside provisions against loans on the basis of an estimate of the long-term, expected (or historical) losses, rather than on the actual, realised losses, which may occur several years later. This type of provisioning creates a reserve, or buffer, that is “dynamic” in the sense that it increases when expected losses exceed actual losses (i.e., in upturns) and is drawn down when actual losses approach expected losses.

Current accounting requirements involve the use of an “incurred loss model”. According to this model, a provision for loan losses is recognised only when a loss impairment event has taken place that is likely to result in non-payment of the loan in the future. Allowing for alternative approaches, such as dynamic provisioning, could facilitate earlier recognition of loan losses and help to mitigate procyclical behaviour.

Supplementary risk measures. A significant build-up of leverage occurred in many financial institutions prior to the crisis. This was readily observable for a number of institutions which exhibited an increasing leverage ratio, measured by the ratio of total assets to equity. However, for many other institutions, the rising leverage was less apparent, since it occurred through techniques such as the transfer of assets to off-balance-sheet vehicles or the accumulation of “embedded” leverage through exposures to structured products. Risk-based capital requirements did not prevent the accumulation of leverage – and hence the destabilising de-leveraging that accompanied the crisis; in fact, in some cases the build-up of leverage resulted directly from attempts to arbitrage the capital requirements.

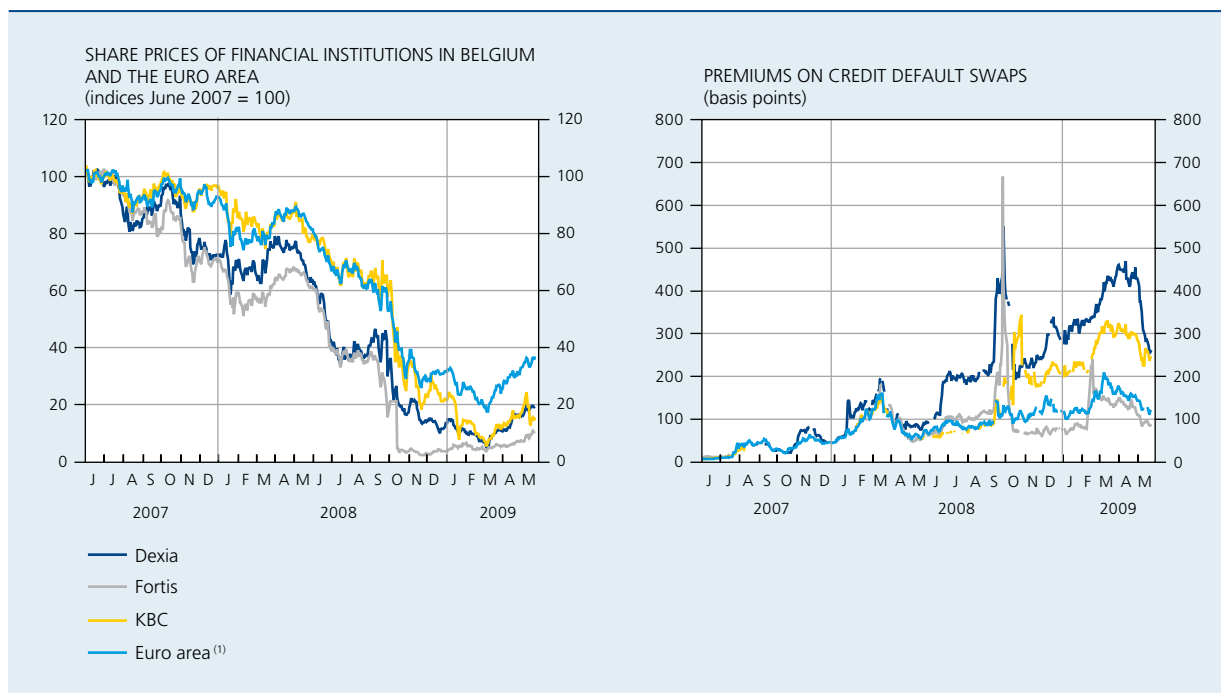
Efforts are now underway to develop a simple non-risk-based measure, such as a minimum leverage ratio, which could complement risk-based capital requirements. The leverage ratio could, for example, be used as an indicator of potential accumulation of risk during boom periods, thereby triggering heightened surveillance of particular institutions. One of the key questions, however, is the appropriate way to measure the leverage ratio. A prerequisite would appear to be the inclusion of off-balance-sheet exposures, but which exposures to include remains an open question. The appropriate definition of capital to use in the denominator of the leverage ratio is also an important aspect of the ongoing discussions.

2. Banking sector

2.1 Developments in the main bancassurance groups

The powerful deleveraging forces and severe disruption in wholesale financing markets afflicting an already fragile global financial system in the days and weeks following the failure of Lehman Brothers on 15 September put severe pressure on the profitability and liquidity position of key credit institutions and insurance companies in the Belgian financial system, requiring government interventions to stabilise market confidence. In the last week of September, serious counterparty concerns emerged in

the market over Fortis and Dexia. These counterparty concerns led to increasing problems for these institutions in renewing their short-term financing on the wholesale markets, abrupt falls in their share prices and escalating premiums applied to credit default swaps (CDS) referencing Fortis or Dexia entities (Chart 11). During the week of 22 September, the price of these credit default swaps – which enable a counterparty (the purchaser of the insurance) to obtain cover from another counterparty (the seller of the insurance) against losses resulting from a credit event relating to the referenced institution – climbed above an annual premium of 500 basis points in the case of Fortis and Dexia. That was well in excess of the premium applied to the CDS of a range of European financial institutions, as measured by the iTraxx Financials

CHART 11 MARKET INDICATORS FOR BELGIAN AND EURO AREA FINANCIAL INSTITUTIONS


Source: Thomson Financial Datastream.

(1) iTraxx Financials for credit default swaps and a stock market index compiled by Thomson Financial Datastream for the share prices of financial intermediaries.

Senior index. The CDS premium for KBC also exceeded that benchmark during the same period, though it was still well short of the extreme levels applicable to Fortis and Dexia. In the case of KBC, the peak was in fact reached two weeks later, following the announcement of substantial writedowns on a portfolio of collateralised debt obligations (CDOs).

While a material exposure (42 billion euro at the end of June 2008) to structured finance instruments undoubtedly contributed to the erosion of market and counterparty confidence in the Fortis group, its vulnerability to the extremely tense and unstable conditions in international financial markets stemmed mainly from concerns over the group's reduced financial flexibility since the acquisition of ABN AMRO. It was in October 2007 that Fortis had made that acquisition, jointly with Royal Bank of Scotland (RBS) and Santander. This deal was the culmination of a takeover process launched several months previously, which in legal terms was effected by RFS Holdings B.V., an entity specially created for the purpose and owned jointly by the three groups. Fortis, RBS and Santander agreed on a shareholder structure for RFS Holdings in proportion to their respective financial commitments which, in Fortis' case, amounted to 24 billion euro. Fortis had obtained approval from the European Commission – as the relevant

competition authority – for the acquisition of ABN AMRO, but on condition that certain competition problems raised by the deal on the Dutch banking market were resolved by a series of divestments concerning specific parts of the Dutch division of ABN AMRO.

Since most of the transfers of parts of ABN AMRO to Fortis were scheduled to take place between the end of 2008 and the end of 2009, Fortis was to have sufficient time to implement four measures to enable it to meet its solvency targets, namely retained earnings, strict control of the growth of its capital requirements, total or partial disposal of non-strategic assets, and the raising of non-diluting capital instruments.

On 26 June 2008, following a further deterioration in market conditions from the end of May and the prospect of losses as a result of the forced sale of certain Dutch commercial banking activities as required by the European Commission, Fortis announced that it was modifying and speeding up its solvency plan. These new measures totalling 8.3 billion euro comprised a capital increase and an issue of non-diluting capital instruments, the decision not to pay an interim dividend in 2008 and a proposal for paying the 2008 dividend in the form of shares, and other capital relief measures such as disposals of non-strategic

assets. The announcement of these measures triggered a further fall in the Fortis share price.

Following the collapse of Lehman Brothers, Fortis faced serious refinancing problems on the interbank and wholesale markets, and the withdrawal of deposits by professional counterparties. The institution's financial condition deteriorated to such a point on 26 September that the only solution consisted in a government-led emergency rescue operation involving capital support for the banking subsidiaries of the group and emergency liquidity assistance by the National Bank of Belgium. This emergency liquidity assistance (ELA) was extended until 9 October and peaked at the equivalent of 51.3 billion euro on 3 October.

The rescue operation mounted in the weekend of 27 and 28 September by the Dutch, Belgian and Luxembourg governments proved to be the start of a long and drawn-out process that is described in more detail in Box 2, involving the forced sale of the Dutch activities (including the participation in ABN AMRO) to the Dutch State (on 3 October), the take-over of Fortis Bank Belgium by the Belgian government (on 6 October) and, subsequently, the conclusion of an agreement with the French bank BNP Paribas to acquire a majority stake in this company. While some of these transactions became the subject of legal proceedings that delayed their effective execution and implementation, a majority of Fortis' shareholders approved the revised terms of agreement with BNP Paribas at the shareholder's meetings of Fortis SA/NV and Fortis NV at the end of April 2009.

Box 2 – Measures taken by the authorities to bolster financial stability in Belgium

Alongside the actions taken by the National Bank of Belgium to provide emergency liquidity assistance when necessary, the Belgian authorities have taken various measures to bolster the stability of the Belgian financial system:

- the recapitalisation of systemic financial institutions and the provision of guarantees of assets or liabilities;
- a State guarantee scheme to facilitate the refinancing of financial institutions;
- raising the level of protection offered by the Deposit Guarantee Scheme.

Recapitalisation measures and guarantees of assets or liabilities

The Belgian Government participated in the recapitalisation of financial institutions in need only when no private sector solution could be found. Recapitalisations occurred on an ad hoc basis and were conditional on a series of changes at the recapitalised institutions. These recapitalisations concerned Fortis Bank Belgium, Dexia, KBC and Ethias.

Fortis Bank Belgium

On 29 September 2008, the governments of Belgium (via the Federal Participation and Investment Corporation – FPIC), the Netherlands and Luxembourg concluded an agreement whereby each of the three countries acquired a stake of around 49 p.c. in the capital of the Fortis Bank entity located in its own territory. The only way to immediately inject funds in the group was for the Belgian State to participate to a capital increase at the level of Fortis Bank Belgium, using the authorisation given by the general meeting of Fortis Bank Belgium to its Board to increase its capital by 4.7 billion euro. This represented a stake of 49 p.c. in the capital of Fortis Bank Belgium. On 3 October, the Dutch government acquired the banking and insurance business of the Fortis group based in the Netherlands (including ABN AMRO), for a total of 16.8 billion euro. Following this purchase, the Belgian and Dutch entities of the Fortis group were uncoupled and the Dutch part of the 29 September deal was cancelled.

On 6 October, the Belgian State acquired, for 4.7 billion, the shares which Fortis Holding held in Fortis Bank Belgium, a transaction which resulted in 99.93 p.c. ownership of Fortis Bank Belgium. At the same time, the Belgian government – retaining a blocking minority – agreed with BNP Paribas to transfer just under 75 p.c. of

its stake in the capital of Fortis Bank Belgium in exchange for 121.2 million shares to be issued by BNP Paribas. It was also agreed that BNP Paribas would take over the Belgian insurance business belonging to Fortis Holding and acquire a 66 p.c. stake in the banking activities of Fortis Holding in Luxembourg. It was further decided to transfer to a special purpose vehicle (SPV) a portfolio of risky assets held by Fortis Bank Belgium for a total amount of 10.4 billion euro. The European Commission approved the various recapitalisation operations involving Fortis Belgium and Luxembourg on 3 December.

However, on 12 December 2008, the Brussels Court of Appeal suspended the sale of the shares of Fortis Bank Belgium to BNP Paribas and decided that the sales to the Dutch and Belgian States (and the subsequent sale to BNP Paribas) had to be submitted to the vote of the shareholders. On 11 February, the Fortis Holding Shareholders' Extraordinary General Meeting voted against the sale of the Dutch component of Fortis group to the Dutch State and against the sale of 50 p.c. plus one share of Fortis Bank to the FPIC. Further to these decisions, the Belgian State, Fortis Holding and BNP Paribas reached a new agreement on 6 March 2009 whereby BNP Paribas confirmed that it would buy 75 p.c. of Fortis Bank from the Belgian State, and agreed to finance the acquisition by Fortis Bank of 25 p.c. of the insurance activities of Fortis in Belgium. This new agreement was approved by a majority of Fortis' shareholders at the shareholder's meetings of Fortis SA/NV and Fortis NV on 28 and 29 April 2009. Under the revised terms of the deal with BNP Paribas, the transfer of the structured credit portfolio by Fortis Bank to the SPV is supplemented in the new *Protocole d'Accord* by additional lines for a total amount close to 2 billion euro, of which 1 billion euro replaces redemptions which have occurred since 31 August 2008. The total value of the SPV has been brought to 11.4 billion euro from 10.4 billion euro. The Belgian State agrees to guarantee the losses on the toxic assets of Fortis Bank for an amount of 1.5 billion euro, on condition that Fortis Bank covers the first losses for an amount of 3.5 billion euro. The Belgian State also undertakes to recapitalise Fortis Bank, if necessary, for a period of three years for a maximum amount of 2 billion euro, which would imply increasing its participation in Fortis Bank above 25 p.c. The European Commission approved all those operations on 12 May 2009 and the deal with BNP Paribas was closed on the same day.

Dexia

The recapitalisation of Dexia, on 30 September, amounting to 6.4 billion euro, was the result of a joint intervention by the Belgian, French and Luxembourg governments. In Belgium, the 3 billion euro recapitalisation was realised with the aid of the federal government (1 billion, via the FPIC) and the regional governments (500 million from the Flemish Community, 350 million indirectly from the Walloon Region and 150 million from the Brussels-Capital Region), and existing institutional shareholders (Holding Communal, Arcofin and Ethias for a total of 1 billion). The French public authorities and existing institutional shareholders (Caisse des Dépôts et Consignations and CNP Assurances) contributed 3 billion to the increase in Dexia's capital. The Luxembourg government committed to subscribe to the issue of new convertible bonds totalling 376 million.

In addition, on 14 November 2008, the Belgian and French States agreed to guarantee the commitments of Dexia under a put option in favour of FSA Asset Management (FSAAM), a Dexia subsidiary which will not be included in the sale of FSA to the US monoline insurance company Assured Guaranty. To ring-fence Assured Guaranty from the risks related to the financial products owned by FSAAM, Dexia wrote a put option in favour of FSAAM allowing it to sell all or part of this portfolio to Dexia. This portfolio amounted to 16.5 billion dollar. The Belgian and French States agreed to guarantee the commitments of Dexia under this put option over and above a first loss of 3.1 billion US dollar in excess of the then existing reserves of 1.4 billion US dollar.

On 13 March, the European Commission authorised the guarantee of the Belgian and French States on the commitment taken by Dexia regarding the put option in favour of FSAAM. The other measures included in the Dexia group restructuring plan (capital increase, extension of the State guarantee scheme and of its conditions) are still being examined by the European Commission.



KBC

On 27 October 2008, the Belgian government subscribed to the issue by KBC of hybrid core capital securities totalling 3.5 billion euro. The European Commission authorised this transaction on 18 December.

On 22 January 2009, KBC reached an agreement with the Flemish regional government for a hybrid core capital injection of 2 billion euro in order to enable KBC to maintain its Tier I ratio for the banking activities at approximately 10.5 p.c. In addition, an agreement was reached for a stand-by hybrid core capital facility of 1.5 billion euro on which KBC could draw if needed.

On 13 May 2009, the Federal government decided to grant KBC a guarantee on a portfolio of structured credit instruments with an initial value of 22.5 billion euro. The guarantee arrangement, covering 90 p.c. of the default risk beyond a set first loss, consists of three tranches. A first loss tranche of 5.7 billion euro is assumed by KBC. In the second tranche, the Belgian State is ready to subscribe to new KBC shares at market value for an amount equal to 90 p.c. of the losses, the maximum commitment being 2.0 billion euro. KBC shareholders have, however, the option to opt out of this equity subscription guarantee by subscribing themselves to the necessary capital increase. The third tranche consists of a State guarantee for 90 p.c. of realised losses on the remaining initial value of the portfolio of up to 14.8 billion euro. In addition KBC must first draw on the stand-by hybrid core capital facility put in place in January 2009 by the Flemish regional government.

Ethias

On 21 October 2008, the Belgian federal government, plus the Flemish Community and the Walloon Region, decided to recapitalise the insurance company Ethias in the sum of 500 million euro each, making a total of 1.5 billion euro. The European Commission approved the recapitalisation plan in favour of Ethias on 12 February 2009.

State guarantee to facilitate refinancing on the interbank and wholesale markets

As from 16 October 2008 the Belgian government set up a temporary guarantee scheme to facilitate the refinancing of credit institutions and financial holding companies on the interbank and wholesale markets. Participation in the scheme is voluntary, and the institutions concerned must apply to join. The eligibility criteria for the scheme relate to the institution's solvency and liquidity and its importance for the Belgian economy and for the protection of depositors in general.

The guarantee can be granted for all finance raised by the beneficiary institution for the purpose of refinancing itself with credit institutions and institutional counterparties, including in the form of bonds and debt instruments issued to institutional investors, so long as the borrowings mature before 31 October 2011. The scheme thus covers instruments such as interbank deposits, deposits by fiduciaries, central bank deposits, institutional deposits, commercial paper, certificates of deposit and negotiable medium-term notes, provided they were contracted or renewed by the beneficiary institution between 9 October 2008 and 31 October 2009. The guarantee is granted in return for payment of a fee reflecting the financial benefit derived by the institution from this guarantee. On 20 November 2008, the European Commission authorised the guarantee schemes set up jointly by the Belgian, French and Luxembourg governments for Dexia group, and the Belgian government's scheme for Fortis Bank Belgium. The latter did not use it. A state guarantee scheme was also implemented in March 2009 in favour of the Holding Communal-Gemeentelijke Holding.



Increase in the maximum amount of compensation available from the Protection Fund

The Royal Decree of 14 November implementing the law of 15 October 2008 raises the cover offered to deposit holders from 20,000 to 100,000 euro, and offers insurance companies, on a voluntary basis, the opportunity to guarantee class 21 life insurance products in a similar way. For this purpose, the government set up the Special Protection Fund for deposits and life insurance. This Fund covers class 21 life insurance products, and the 50,000 to 100,000 euro tranche of deposits with credit institutions, the first tranche of 0 to 50,000 euro being covered by the existing Protection Fund for deposits and financial instruments.

As highlighted in Box 2, Dexia group also required emergency interventions from the authorities at the end of September, owing to refinancing problems in the aftermath of the Lehman Brothers failure. The problems resulted from the group's heavy dependence on wholesale funding markets for the financing of a large balance sheet – characterised by significant maturity mismatches – and market concerns over its high exposure to assets originated in the US.

The heavy reliance on the wholesale markets reflected the fact that the group only collects retail deposits in Belgium and Luxembourg. To supplement these retail funding sources, Dexia's business model relied on the mobilisation of a large proportion of its substantial portfolio of highly-rated debt securities to borrow on the secured wholesale funding markets. The dislocation of these markets, which became particularly acute in the days following the collapse of Lehman Brothers affected several of its key sources of funding. This funding liquidity shock for Dexia occurred at a time of market concerns over the group's large exposure to US assets and structured credit instruments, and distressed market prices for many of its highly-rated bonds as a result of a sharp and widespread increase in liquidity risk premiums.

Dexia group's large exposure to asset-backed securities resulted mainly from the activities of Financial Security Assurance (FSA), the US subsidiary of Dexia Crédit local de France. The core business of FSA, one of the world's five leading monoline bond guarantors, consists in protecting bond investors against the default risk associated with a particular bond by offering credit insurance covering the payment of the coupons and the principal. If the bond's original debtor defaults, the financial guarantor, also called the monoline insurer, undertakes to ensure continuity of the coupon and principal payments to the holders in accordance with the payment schedule specified in the contractual clauses relating to the insured bond. This credit insurance technique, introduced in 1971, was initially used on the US municipal bond market, before being steadily

extended from the mid 1980s to the insurance of securitised assets and structured finance instruments, such as (tranches of) mortgage-backed securities (MBS) and other asset-backed securities (ABS) and, more recently, collateralised debt obligations (CDO). It was through these last asset classes that the international financial crisis affected the monoline insurance sector, which suffered much larger than expected losses on US mortgage-backed securities.

While FSA had refrained from insuring the riskiest securities, it nonetheless was not immune when the losses spread to other types of mortgage-backed securities as a result of the proliferating problems on the US housing market. These developments concerned only a small part of the outstanding amount of the insurance guarantees granted by FSA, totalling 443 billion dollar at the end of June, of which 30 p.c. concerned asset-backed securities and 70 p.c. public finance securities. Nevertheless, they were a significant source of potential losses and, moreover, contributed to valuation losses on the portfolio of 16.5 billion dollar in asset-backed securities which FSA held in its Asset Management entity, whose main activity consists in offering guaranteed investment contracts to municipalities and other investors wishing to invest only in instruments with an AAA rating. On 21 July, Moody's placed FSA's AAA rating on review for possible downgrade. This prompted Dexia to announce, on 6 August, a recapitalisation of FSA in the sum of 300 million euro and the provision of a 5 billion dollar confirmed and unsecured liquidity line for FSA's Asset Management subsidiary. The purpose of this line was to ensure repayment of the liabilities of this business line and to avoid having to crystallise the losses which would result from a premature sale of assets from that subsidiary's portfolio. FSA also announced that it was withdrawing from the business of insuring asset-backed securities.

As part of its Transformation Plan, which is aimed *inter alia* at reducing the risk profile of the group, Dexia announced on 14 November 2008 that it had entered into a sale and purchase agreement with monoline bond insurer Assured

Guaranty relating to the sale of FSA Holdings, excluding its Financial Products activity performed through FSA Asset Management (FSAAM). This transaction is expected to close in the second quarter of 2009.

The non-transferred activities of FSAAM have been consolidated in the group's accounts and put into run-off. To ring-fence Assured Guaranty from the risks related to the portfolio of assets owned by FSAAM, Dexia wrote a put option in favour of FSAAM allowing it to sell all or part of that portfolio to Dexia. The Belgian and French States agreed to guarantee the commitments of Dexia under this put option over and above a first loss of 3.1 billion US dollar in excess of the then existing reserves of 1.4 billion dollar. Other measures aimed at reducing the risk profile of Dexia group include the limitation of market activities and cessation of proprietary trading activities. In order to reduce Dexia group's reliance on the wholesale markets and improve its structural liquidity positions, bond investment activities were stopped and the existing portfolios have been put into run-off.

Since 9 October 2008, Dexia has benefited from the combined guarantee of the States of Belgium, France and Luxembourg covering many of its funding sources. This guarantee relates to a total maximum amount of 150 billion euro and covers Dexia's liabilities towards credit institutions and institutional counterparties, as well as bonds and other debt securities issued for the same counterparties, provided that these liabilities, bonds or securities fall due before 31 October 2011 and have been contracted, issued or renewed between 9 October 2008 and 31 October 2009. As of 13 May 2009, the outstanding amount of guaranteed funding came to 92.6 billion euro. Dexia's liquidity position should also benefit from a sharp decline in new loan production in markets considered (henceforth) to be non-core to the group's business strategy, and from reduced drawings on committed credit lines in the US.

While KBC group did not experience institution-specific funding liquidity problems in the aftermath of the Lehman Brothers failure, over and above the significant tightening of financial conditions in the wholesale markets in general, its CDS premium also spiked in October. This development followed Moody's announcement of the downgrading of the rating on a series of collateralised debt obligations created by KBC Financial Products. The group – whose uninsured exposure to these structured finance instruments came to 16 billion euro at the end of June 2008 – had to post a substantial loss on these investments in its results for the third quarter. Since this development occurred in a period during which many European governments announced plans to help credit

institutions bolster their capital buffers as an additional insurance against future losses – in line with the apparent increase in the normal standard which markets expect of a well-capitalised bank – the Belgian government subscribed, on 27 October, to the issue of 3.5 billion euro of hybrid core capital securities, which KBC has used to increase its core Tier I capital in the banking business by 2.25 billion euro and the capital base of the insurance business by 1.25 billion euro. In January 2009, KBC's capital base was further strengthened by a similar transaction with the Flemish regional government, this time for 2 billion euro, plus a supplementary stand-by facility of 1.5 billion euro. This transaction followed a period of sharp falls in KBC's share price, related to the announcement by Moody's of a revision of the assumptions underlying its ratings for corporate synthetic CDOs at the end of 2008, and heightened concerns over the economic prospects in a number of countries where KBC is present through subsidiaries, including in Central and Eastern Europe, where it has developed a second home market.

In May 2009, KBC announced significant losses on a portfolio of CDOs covered by an insurance from the monoline insurance company MBIA, contributing to a net bottom line loss of 3.6 billion euro for the first quarter of the year (Table 1). This insurance coverage by MBIA concerned a total insured amount of 14 billion euro. The value of this credit protection bought from MBIA declined significantly when MBIA announced a restructuring, which included the spin-off of valuable assets from the unit being KBC's counterparty. On 13 May 2009, the Federal government decided to grant KBC a guarantee on structured credit instruments with an initial value of 22.5 billion euro. The guarantee arrangement, covering 90 p.c. of the default risk beyond a set first loss, consists of three tranches. A first loss tranche of 5.7 billion euro is assumed by KBC. In the second tranche, the Belgian State is ready to subscribe to new KBC shares at market value for an amount equal to 90 p.c. of the losses, the maximum commitment being 2.0 billion euro. KBC shareholders have, however, the option to opt out of this equity subscription guarantee by subscribing themselves to the necessary capital increase. The third tranche consists of a State guarantee for 90 p.c. of realised losses on the remaining initial value of the portfolio of up to 14.8 billion euro. In addition KBC must first draw on the stand-by hybrid core capital facility put in place in January 2009 by the Flemish regional government.

The overview of some key financial indicators for the main bancassurance groups in Table 1 highlights the major impact that the global financial crisis has had on the performance of the three main bancassurance groups in 2008 and the corresponding sector aggregates that will be used in the rest of the report. In this connection, it is

important to recall that these sector aggregates, which are based on the data available in the standardised supervisory reporting schemes, only include the data on Dexia Bank Belgium and not those for the other Dexia group subsidiaries.⁽¹⁾ In the fourth quarter of 2008, Fortis Bank Nederland Holding was removed from the consolidation scope of Fortis Bank, and that also affected the reported aggregates for the Belgian banking sector as at the end of 2008.

(1) As discussed in more detail in the Financial Stability Review 2005 (55-57), the supervision of the main bancassurance groups is conducted at three levels, namely sectoral supervision of banking and other financial subsidiaries, sectoral supervision of insurance companies, and supplementary supervision at holding company level. The above-mentioned standardised reporting schemes concern the sectoral (and separate) supervision of the groups' insurance companies and banking subsidiaries for which the CBFA carries first-line supervision responsibility, on account of the legal structure of the group and/or the home-host supervisory arrangements concluded for the sectoral and supplementary group supervision. As a consequence, these reporting schemes do not include data on all the groups' subsidiaries. In the case of the Dexia group, for example, the prudential sector aggregates for the Belgian banking sector cover only the activities of Dexia Bank Belgium (and its subsidiaries), leaving out the operations conducted by the group's subsidiaries in France (Dexia Cr dit Local and its subsidiary FSA), Luxembourg (Dexia BIL) and Turkey (Denizbank). The information collected by the CBFA for the supplementary supervision at holding company level – on the basis of non-standardised group-specific reporting frameworks – does, of course, cover all the groups' subsidiaries.

TABLE 1 KEY INDICATORS FOR THE FOUR MAIN BANCASSURANCE GROUPS, THE BANKING SECTOR AND THE INSURANCE SECTOR
(consolidated data, billion euro, unless otherwise stated)

| | Fortis Group | | KBC Group ⁽¹⁾ | Dexia Group ⁽¹⁾ | Banking sector ⁽²⁾ | Insurance sector ⁽³⁾ |
|--|------------------------|----------------------------|--------------------------|----------------------------|-------------------------------|---------------------------------|
| | Holding ⁽¹⁾ | Fortis Bank ⁽¹⁾ | | | | |
| Net profit | | | | | | |
| 2006 | 4.35 | | 3.43 | 2.75 | 9.7 | 2.2 |
| 2007 | 3.99 | | 3.28 | 2.53 | 6.7 | 3.8 |
| 2008 | -28.02 | -20.6 | -2.48 | -3.33 | -21.2 | -3.1 ⁽⁸⁾ |
| 2009 (Q1) | 0.04 | | -3.60 | 0.25 | | |
| Total assets | | | | | | |
| 2006 | 775.2 | | 325.4 | 566.7 | 1,422.0 | 201.9 |
| 2007 | 871.2 | | 355.6 | 604.6 | 1,578.4 | 220.4 |
| 2008 | 92.9 | 586.8 | 355.3 | 651.0 | 1,422.1 | 220.2 ⁽⁴⁾ |
| 2009 (Q1) | | | | 636.0 | | |
| Risk-weighted assets (banking) | | | | | | |
| 2006 | | 240.1 ⁽⁵⁾ | 129.0 ⁽⁵⁾ | 133.4 ⁽⁵⁾ | 526.9 ⁽⁵⁾ | |
| 2007 | | 270.2 ⁽⁵⁾ | 135.1 ⁽⁶⁾ | 159.4 ⁽⁵⁾ | 583.5 ⁽⁸⁾ | |
| 2008 | | 203.4 ⁽⁶⁾ | 141.4 ⁽⁶⁾ | 152.8 ⁽⁶⁾ | 491.7 ⁽⁶⁾ | |
| 2009 (Q1) | | | 135.9 ⁽⁷⁾ | 153.3 ⁽⁶⁾ | | |
| Tier I ratio banking (p.c. of RWA) | | | | | | |
| 2006 | | 7.1 | 9.0 | 9.8 | 8.7 | |
| 2007 | | 9.5 | 8.7 | 9.1 | 12.1 ⁽⁸⁾ | |
| 2008 | | 10.7 | 11.2 ⁽⁷⁾ | 10.6 | 11.3 | |
| 2009 (Q1) | | | 11.0 ⁽⁷⁾ | 10.7 | | |
| Risk asset ratio banking (p.c. of RWA) | | | | | | |
| 2007 | | 10.1 | 12.7 | 9.6 | 11.2 ⁽⁸⁾ | |
| 2008 | | 18.7 | 14.9 ⁽⁷⁾ | 11.8 | 16.2 | |
| 2009 (Q1) | | | 14.9 ⁽⁷⁾ | 12.0 | | |
| Insurance solvency margin (p.c. of required margin) | | | | | | |
| 2007 | 235 | | 265 | | | 223 ⁽⁴⁾ |
| 2008 | 202 | | 188 | | | 205 ⁽⁴⁾ |
| 2009 (Q1) | | | 158 ⁽⁷⁾ | | | |

Sources: Annual accounts of Fortis group, Fortis Bank, Dexia group and KBC group, CBFA, NBB.

(1) Consolidated data at group level, as published in the group annual and quarterly accounts.

(2) Consolidated data, based on the prudential reporting scheme, which does not always include all of the groups' subsidiaries.

(3) Unconsolidated data, based on the prudential reporting scheme.

(4) As according to the quarterly accounts.

(5) As calculated according to Basel I.

(6) As calculated according to Basel II.

(7) Pro forma figures, including the capital support transactions with the Belgian and Flemish governments of January and May 2009.

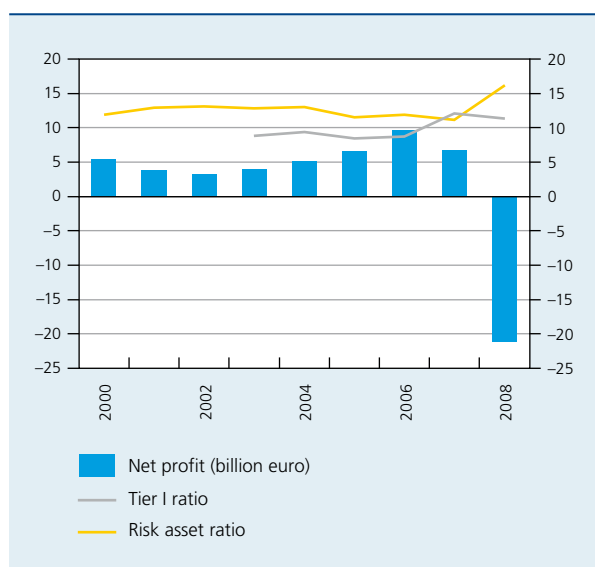
(8) Mix of Basel I and Basel II risk-weighted assets.

2.2 Profitability and solvency

Looking at the aggregate data for the Belgian banking sector, as defined in the footnote on the previous page, the *annus horribilis* for the main Belgian bancassurance groups revealed itself most clearly in the unprecedented deterioration in the sector's bottom-line result, showing a loss of 21.2 billion euro (Chart 12). Exceptional losses and one-off risk charges related to the restructuring and de-risking strategies undertaken at the main bancassurance groups account for a significant share of these losses. To the extent that these actions relieved banks of business strategies and legacy exposures unsuited to, or vulnerable in, the current challenging – and in some respects structurally changing – operating environment, they will contribute to the restoration of profitability in the future. Such an ability to generate profits is the first buffer against unexpected adverse developments in the operating environment.

In spite of the large loss recorded in the income statement, the risk asset ratio rose to 16.2 p.c. in 2008, while the Tier I ratio stabilised at a level above 11 p.c. Both indicators express capital buffers in terms of risk-weighted assets. The changes in these solvency ratios between 2007 and 2008 reflect a number of factors, including government-led recapitalisations through Tier I capital instruments (as described in the previous section), the complete transition in 2008 to the Basel II framework for the calculation of risk-weighted assets, and, the composition of the income statement loss reported last year.

CHART 12 PROFITABILITY AND SOLVENCY
(consolidated data, percentages, unless otherwise stated)



Sources: CBFA, NBB.

TABLE 2 BREAKDOWN OF REGULATORY SOLVENCY RATIOS
(consolidated data, billion euro, unless otherwise stated)

| | 2006 | 2007 | 2008 |
|--|--------------|--------------|--------------|
| Total regulatory own funds ... | 62.3 | 63.6 | 79.5 |
| Composing elements: | | | |
| Tier I ⁽¹⁾ | 45.9 | 67.5 | 55.7 |
| of which: | | | |
| hybrid capital instruments | 4.9 | 7.8 | 7.8 |
| deductions (-) | 2.7 | 4.8 | 6.4 |
| Tier II ⁽²⁾ | 19.7 | 22.6 | 24.6 |
| of which: | | | |
| deductions (-) | | 0.6 | 1.3 |
| Tier III ⁽³⁾ | 0.1 | 0.0 | 0.1 |
| Deductions from total capital ⁽⁴⁾ (-) | 3.3 | 26.6 | 1.0 |
| Risk-weighted assets | 526.9 | 583.5 | 491.7 |
| as calculated according to (p.c. of total) | | | |
| Basel I | 100 | 77 | 0 |
| Basel II | 0 | 23 | 100 |
| Solvency ratios (percentages) | | | |
| Tier I ratio | 8.7 | 12.1 | 11.3 |
| Risk asset ratio | 11.9 | 11.2 | 16.2 |

Sources: CBFA, NBB.

- (1) Includes paid-up capital and share premiums, eligible reserves and income from the current year, revaluation reserves and associated prudential filters, hybrid capital instruments, third-party interests and deductions (for e.g. intangible assets, participations).
- (2) Upper Tier 2 elements include revaluation reserves, the internal security fund, perpetuals and other subordinated instruments for which the principal or interest payments may be suspended in case of losses. Lower Tier 2 elements include long-term subordinated debts (minimum initial maturity of 5 years).
- (3) Includes the trading portfolio's net result and short-term subordinated debts, after application of the regulatory limitations.
- (4) Basel I and Basel II rules regarding the deductions from Tier I, Tier II or total regulatory own funds are different, which explains in part the changes in the amounts of deductions in the Tier I and Tier II components of total regulatory capital between 2006 and 2008.

Some indications about the relative importance of these factors can be gathered from the data reported in Table 2, which shows the composition of total available regulatory capital, the level of risk-weighted assets and the relative shares of these total risk-weighted assets that were calculated according to the Basel I and Basel II frameworks respectively.

As regards the influence of the composition of the income statement loss in 2008 on regulatory capital, it is important to note that more than 12 billion euro of the 21.2 billion euro headline loss referred to above can be attributed to exceptional losses on discontinued operations, other impairments, and losses related to deferred tax assets. Most of these were related to the sale of the

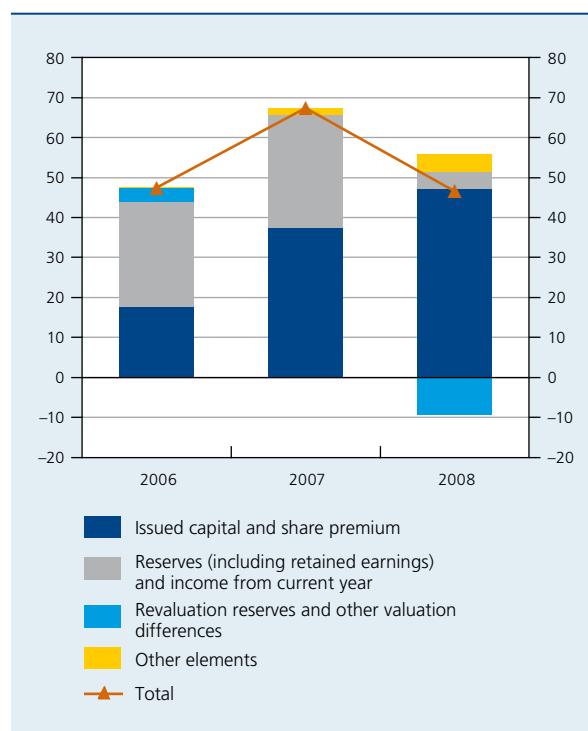
Dutch banking activities of Fortis Bank. The divestment of Fortis Bank Nederland Holding included the ABN AMRO activities that Fortis had acquired in 2007 as part of the RFS consortium, for a total consideration of 24 billion euro (cf. previous section). At the end of 2007, the value of this participation of Fortis in RFS Holdings was deducted from the total regulatory own funds. This sizeable deduction was, however, to a large extent compensated by the positive impact of the Tier I capital increases that Fortis undertook in 2007 to finance this acquisition in. As Tier I capital was not impacted by the deduction of the RFS participation, the accounting treatment of the ABN AMRO acquisition and related Fortis Tier I capital issues tended to inflate the relative level of Tier I capital, even to the point of where it exceeded the total regulatory own funds in 2007. When large impairments had to be recognised on the sale of the devalued Dutch assets in 2008, the corresponding income statement losses were compensated by a decline in the amount of deductions at the level of total regulatory own funds, but also contributed to the observed decline in the level of Tier I capital as this capital component had to absorb the income statement loss of more than 12 billion euro while not benefiting from the decline in the total amount of deductions. These were only partly compensated by the government-led recapitalisations taking the form of Tier I instruments.

The regulatory solvency ratios were also supported by a decline in the total amount of risk-weighted assets, reflecting the deconsolidation of Fortis Bank Nederland for about one third and the sector-wide implementation of the Basel II capital adequacy rules, including the effective implementation of the advanced internal ratings-based approaches for credit risk in Pillar I, giving many assets of the main Belgian banks a more favourable risk weighting than under the previous Basel I regime. While it is not possible to disentangle the impact of this transition from other elements affecting the level of risk-weighted assets, the 15.7 p.c. decline in the outstanding total of the latter between end 2007 and end 2008 suggests that its impact on reported solvency ratios was significant.

As noted in section 1, market assessments of solvency and loss absorption capabilities of the global banking sector extended beyond the regulatory solvency measures, and increasingly focused, in fact, on common equity levels and unweighted asset leverage ratios. This common equity is mainly composed of the issued capital and share premiums, complemented by the reserve of earnings that were retained (i.e. not distributed to shareholders) in the past and the net result for the current year. These core capital items have intrinsically higher loss absorption potential

CHART 13 DEVELOPMENT AND BREAKDOWN OF ACCOUNTING EQUITY

(consolidated data, billion euro)



Sources: CBFA, NBB.

than some other forms of Tier I or Tier II capital, which include for example preference shares and certain types of subordinated bonds. All other things being equal, losses will first and foremost lead to a decline in available reserves, before affecting other components of the capital base.

Chart 13 shows the development and breakdown of the Belgian banking sector's book equity (or accounting own funds) in the period 2006-2008, distinguishing, at the end of each period, between the outstanding amount of issued capital and share premiums, reserves (including retained earnings) and income from the current year, revaluation reserves and other valuation differences and other elements. This chart shows that the movement in the Belgian banking sector's own funds contrasted somewhat with the picture for the regulatory own funds, as total capital increased in 2007, then dropped back (by 20.7 billion euro) in 2008.

While the Tier I capital issues by Fortis Bank to finance the acquisition of ABN AMRO contributed to a significant increase in the amount of issued capital and share premiums in 2007, the corresponding stake in RFS Holdings was

TABLE 3 IMPACT OF VALUATION CHANGES ON FINANCIAL ASSETS HELD BY BELGIAN CREDIT INSTITUTIONS
(consolidated data, billions of euro)

| | 2006 | 2007 | 2008 |
|--|------|------|------|
| Impact via the profit and loss account (flows during the period) | | | |
| Realised or unrealised gains or losses (–) on financial instruments | 3.9 | 3.8 | –3.8 |
| of which: on fixed-income instruments and associated derivatives contained in the portfolio held for trading | 0.5 | –0.9 | –4.9 |
| Impairments | 0.4 | 2.9 | 12.6 |
| of which: on assets available for sale | 0.0 | 2.5 | 7.4 |
| Impact via accounting equity (stock at end of period) | | | |
| Revaluation reserve for securities available for sale | 2.8 | –0.6 | –8.0 |

Sources: CBFA, NBB.

not deducted from accounting own funds, leading to the observed sharp increase in book equity. As a result, the more than 12 billion euro loss in 2008 stemming from discontinued operations, and related to the sale of the Dutch banking activities of Fortis Bank, combined with the rest of the large bottom line loss of the sector in 2008 almost wiped out the reserves available at the end of 2007. An even sharper decline in the sector's own funds was avoided by the government-led recapitalisations of KBC Bank, Dexia Bank Belgium and Fortis Bank Belgium, lifting the total amount of issued capital and share premiums 9.8 billion euro higher between the end of 2007 and the end of 2008.

Another important difference between regulatory own funds and accounting equity that influenced the respective movements in these aggregates in the most recent period lies in the differing treatment of unrealised losses in some of the revaluation reserves. In the calculation of regulatory own funds, prudential filters are applied to some of these, eliminating the impact of positive or negative changes in revaluation reserves that are considered to be transitory. The most relevant revaluation reserve to which such prudential filters apply in the light of recent developments is the revaluation reserve for fixed-income instruments classified on the assets' side of the balance sheet in the IAS 39 portfolio Available for sale. Such Available for sale (AFS) financial instruments have to be marked to market according to the fair value principle, meaning the use of a market price if one is available or a fair value estimate derived from a pricing model if no such market price is available. Unrealised changes in the fair value of these AFS assets do not pass through the

income statement but are directly recognised in banks' accounting equity, unless these changes in fair value are considered to be permanent, in which case they are recognised as an impairment in the profit and loss account. While being an integral part of accounting own funds, these unrealised gains and losses on AFS bonds – judged temporary – are not taken into account for the calculation of regulatory capital, following the application of the prudential filters.

As highlighted in Table 3, changes in the AFS revaluation reserve contributed significantly to the observed decline in the accounting own funds of the Belgian banking sector in 2008, because net unrealised capital gains or losses incorporated in accounting own funds dropped in the course of 2008 by 7.4 billion euro. At the end of 2008, the net outstanding amount of this reserve stood at –8.0 billion euro. This substantial decline in the marked-to-market value of the financial instruments classified as Available for sale occurred in spite of the booking of 7.4 billion euro of impairments on AFS assets. These impairments are recognised in the income statement, and give rise to a reversal of previously recognised unrealised capital losses in the AFS revaluation reserve if applicable. The AFS portfolio, worth 214 billion euro at the end of 2008, was thus a significant source of (un)realised losses in 2008 for the Belgian banking sector.

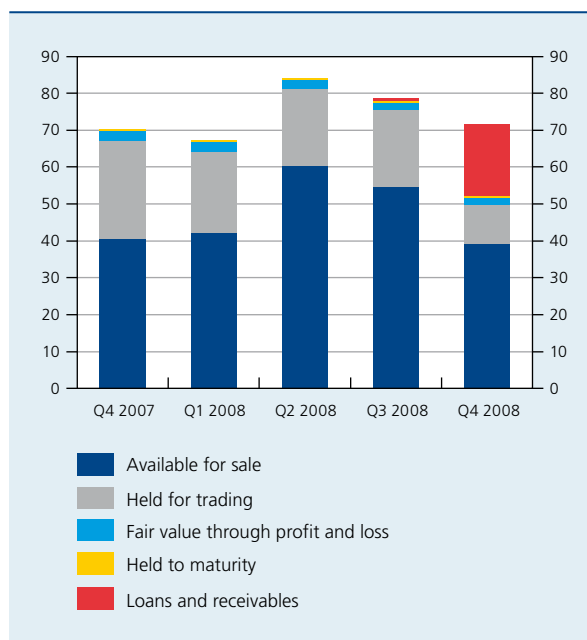
The IAS 39 amendment, following a call by the European Union, has led to the reclassification of a substantial amount of AFS assets to the Loans and receivables portfolio in the fourth quarter of 2008 (Box 3).

Box 3 – Asset reclassifications following the IAS 39 amendment

In October 2008, the International Accounting Standards Board (IASB) issued amendments to IAS 39 and IFRS 7. Endorsed by the European Union on 15 October 2008, these amendments permit a reclassification of financial assets in particular circumstances. Certain non-derivative financial assets Held for trading may be reclassified to the Held to maturity, Loans and receivables or Available for sale portfolios. The same applies to the Available for sale financial instruments, where a transfer to Loans and receivables can be allowed. The amendments to IFRS 7 also impose additional disclosure requirements if the reclassification option is used. The Belgian banks have used this possibility to reclassify assets mainly in the case of corporate debt securities, which include structured credit instruments, as shown in the chart. The total outstanding amount at the end of 2008 of these corporate debt securities was 71.6 billion euro, representing 5 p.c. of total assets or 24 p.c. of the total debt securities portfolio.

BREAKDOWN OF THE CORPORATE DEBT SECURITIES ACCORDING TO IAS/IFRS PORTFOLIO CLASSIFICATION

(billion euro)



Sources: CBFA, NBB.

In addition to the impairments on AFS assets that the income statement had to recognise in 2008, Belgian banks' profit and loss account also had to book a net 3.8 billion euro of other realised or unrealised gains or losses on financial instruments. Taken together, net valuation and impairment losses on financial instruments – whether or not transiting through the income statement and whether or not of a permanent nature – amounted thus to 18.6 billion euro in 2008. Together with the more than 12 billion euro of losses related to the previously

discussed exceptional losses on discontinued operations, the 11.2 billion euro of these losses that passed through the income statement explain the bulk of the net 27.9 billion profit reversal that converted the 6.7 billion profit in 2007 into a 21.2 billion loss in 2008. While the exceptional nature of most of these losses could be interpreted as a sign that Belgian banks will be able to return quickly to profitability, the development of the net result will also depend on the underlying performance of some other important components of the income statement,

such as net interest revenues and fee income or the level of impairments on assets other than AFS financial instruments.

Table 4 shows the main aggregates of the Belgian banking sector's income statement for the years 2007 and 2008. While the deconsolidation of Fortis Bank Nederland may have affected the level of reported earnings, expenses and financial asset impairments in 2008 to some extent, the effect is reportedly moderate, as the related more than 12 billion euro of losses mainly took the form of

large exceptional losses booked on discontinued activities, other impairments, and losses related to deferred tax assets.

Total operating income was a quarter lower than in 2007, resulting in a cost income ratio of 86.1 p.c. (61 p.c. in 2007). This decline in total operating income was mainly the result of losses on financial instruments (–3.8 billion euro), which had contributed positively to total operating income in 2007 and 2006 to the tune of 15 p.c. of total income. The substantial price falls on a large array

TABLE 4 MAIN AGGREGATES OF THE BELGIAN BANKING SECTOR'S INCOME STATEMENT
(consolidated data)

| | Billion euro | | Percentages of operating income |
|---|---------------|---------------|---------------------------------|
| | 2007 | 2008 | |
| Net interest income | 13.30 | 14.48 | 75.1 |
| Non-interest income | 13.01 | 4.80 | 24.9 |
| Net fee and commission income (excluding commissions paid to bank agents) | 7.35 | 6.76 | 35.1 |
| (Un)realised gains or losses on financial instruments ⁽¹⁾ | 3.76 | –3.83 | –19.9 |
| Other non-interest income | 1.91 | 1.86 | 9.7 |
| Total operating income (bank product) | 26.31 | 19.28 | 100.0 |
| Total operating expenses | –16.08 | –16.59 | 86.1⁽²⁾ |
| Staff expenses (including commissions paid to bank agents) ... | –9.15 | –9.20 | 47.7 |
| General and administrative expenses (including depreciation) ... | –6.93 | –7.39 | 38.3 |
| Total impairments and provisions | –3.18 | –13.31 | |
| Impairment losses on financial assets not measured at fair value through profit and loss | –2.89 | –10.30 | |
| Other impairments | –0.02 | –2.33 | |
| Provisions | –0.28 | –0.69 | |
| Share of profit or loss of associates and joint ventures accounted through the equity method | 0.63 | –0.11 | |
| Profit or loss from non-current assets and disposal groups classified as held for sale not qualifying as discontinued operations | 0.01 | –0.72 | |
| Net operating income⁽³⁾ | 7.71 | –11.43 | |
| Total profit or loss on discontinued operations | 0.00 | –9.04 | |
| <i>p.m.</i> Net profit or loss (bottom-line result)⁽⁴⁾ | 6.66 | –21.21 | |

Sources: CBFA, NBB.

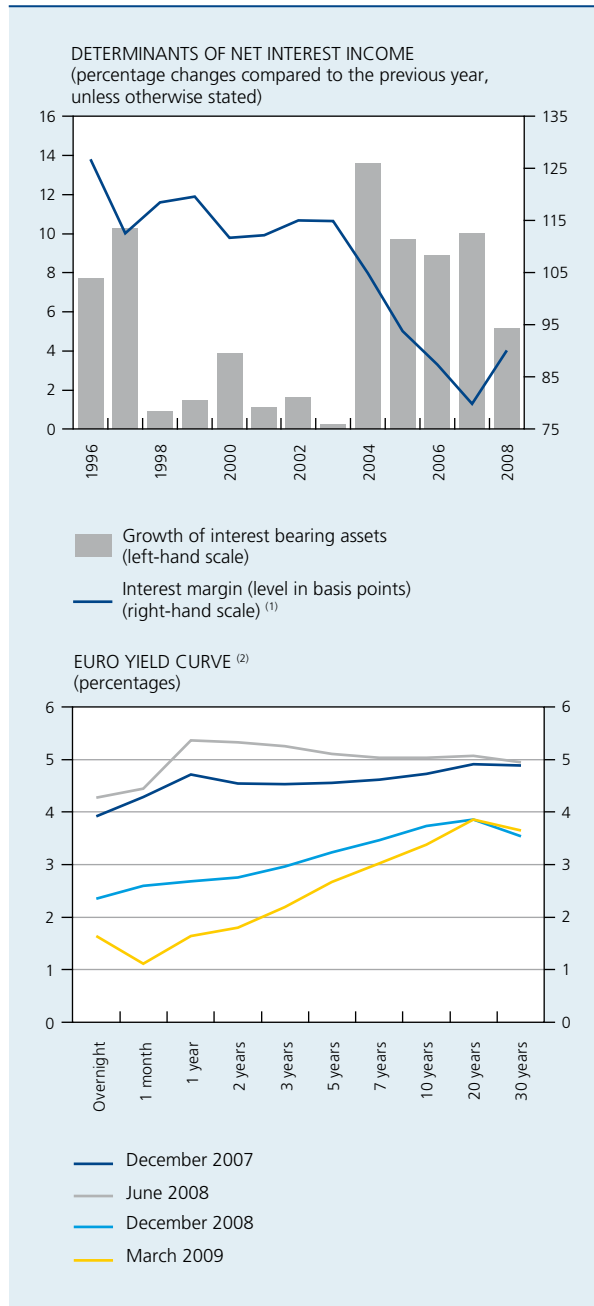
(1) This item includes the net realised gains (losses) on financial assets and liabilities not measured at fair value through profit or loss, the net gains (losses) on financial assets and liabilities held for trading and designated at fair value through profit or loss, and the net gains (losses) from hedge accounting.

(2) This figure is the cost/income ratio of the Belgian banking sector.

(3) Including the negative goodwill immediately recognised in profit or loss, which is not shown as such in the table, and amounted to 0.02 billion euro in 2007 and 0.03 billion euro in 2008.

(4) The amounts of taxes and minority interests, which are items explaining the difference between net operating income and the net bottom-line result, are not broken down in this table, but can be found in Table 10 of the Statistical Annex.

CHART 14 DETERMINANTS OF NET INTEREST INCOME
(unconsolidated data)



Sources: CBFA, Thomson Financial Datastream, NBB.

(1) The interest margin corresponds to the difference between the average implicit interest rate received and paid respectively on banks' average stock of interest bearing assets and liabilities. The averages are calculated over a one-year period.

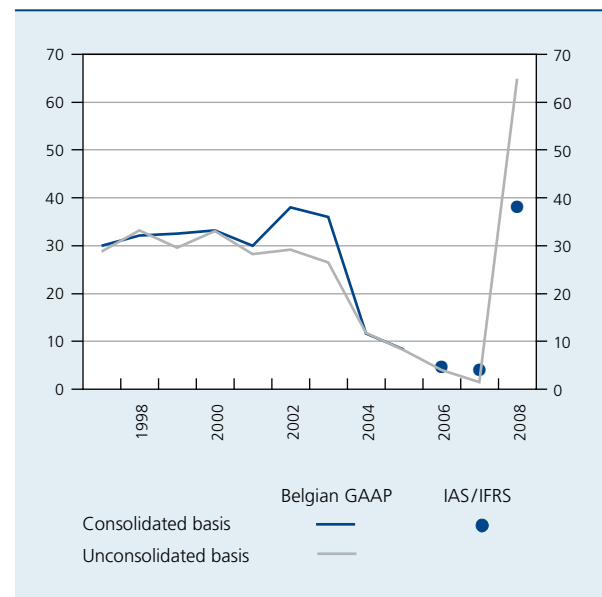
(2) Term structure on the basis of interbank and swap rates.

of financial assets in the last quarter of 2008 as well as extreme price swings and asset correlations were the source of major losses (6.6 billion euro) on financial assets and liabilities Held for trading; these comprise a very large portfolio of derivatives, including those used for hedging purposes. The losses were partly offset by sharply higher

net (un)realised gains on financial assets and liabilities designated at fair value through profit and loss (2.4 billion euro), which may have included the positive effect of falling prices of debt instruments issued by the banks as risk premiums rose. In view of the major losses that banks sustained on their trading activities, some have announced that they are scaling back their (proprietary) trading and derivatives activities in the future. The reclassification of some financial instruments in line with the IAS 39 amendment may also help to reduce the vulnerability of the income statement to further market price fluctuations.

While net fee and commission income dropped by 8 p.c., net interest income increased by 8.8 p.c., lifting its share in total operating income to three quarters. This reversed a period of low to moderate growth in this income component in spite of rising deposit and loan volumes, as these were offset to a large extent by a decrease in the average margin earned between interest-yielding assets and interest-costing liabilities (Chart 14). While these opposing developments in the price and volume determinants were partially linked to the strong volume growth in low-margin business activities, such as (reverse) repurchase agreements and other forms of secured financing, they also reflected downward pressures on commercial lending and deposit margins as a result of

CHART 15 LOAN LOSS RATIO ⁽¹⁾
(basis points)



Sources: CBFA, NBB.

(1) The loan loss ratio is the net flow of new impairments for credit losses, expressed as a percentage of the stock of total loans (one basis point is one hundredth of one percent). As from 2006, the figures on a consolidated basis are the loan loss ratio for the IAS/IFRS category Loans and receivables.

strong competition in recent years. The restoration of higher margins in banks' lending activities, as evidenced by the results of bank lending surveys in Belgium and the euro area, appears to have contributed to the recovery in the net interest margin in 2008. The latter also benefited from the significant steepening of the yield curve in the last quarter of 2008 as a result of the reduction of the ECB's main interest rates.

The side effect of the strong expansion of the interest-earning assets on the balance sheets of Belgian banks in recent years is a potentially higher exposure to credit losses in the coming quarters, given the sharp downturn in the global economy. The loan loss ratio has already increased sharply in 2008 (Chart 15), suggesting that credit losses on the more traditional loan books could constitute a second wave of losses for the Belgian banking sector, and a significant drain on the profitability of the banks in the coming quarters. This rise follows a period of exceptionally low loan losses.

2.3 Credit risk

Credit risk can be defined in the widest sense as the risk of losses due to a counterparty's default or to changes in its creditworthiness (rating migration). In many of their commercial and financial activities – including derivative transactions, off-balance-sheet credit commitments and guarantees –, banks take on current or potential future exposures on counterparties, albeit to different degrees and with varying levels of associated credit risk.

The two principal sources of credit risk exposures (in gross terms) in the Belgian banking system are the loans and the extensive debt securities portfolio. Table 5 provides an overview of these exposures, according to counterparty type, the residency of this counterparty and associated credit quality indicators.

The total loan portfolio of Belgian banks, which includes a very limited amount of loans and advances that come under the IAS/IFRS accounting category Held for trading,

TABLE 5 BREAKDOWN AND CREDIT QUALITY INDICATORS FOR THE LOAN PORTFOLIO AND BANKS' DEBT SECURITIES HOLDINGS (consolidated data)

| | Billion euro | | Breakdown by residency of the counterparty (percentage of total) | | | | Credit quality indicators (percentage of total) | |
|--|--------------|--------------|--|-------------|-------------|-------------------|---|--|
| | 2007 | 2008 | Total | Belgium | Euro area | Rest of the world | Impaired claims ⁽¹⁾ | Coverage ratio of impaired claims ⁽²⁾ |
| Loans and advances⁽³⁾ | | | | | | | | |
| Credit institutions | 320.8 | 213.2 | 27.7 | 1.1 | 16.5 | 10.2 | 0.4 | 68.2 |
| Corporate | 313.5 | 290.7 | 37.8 | 14.4 | 8.5 | 14.9 | 2.4 | 47.1 |
| Retail | 276.2 | 208.0 | 27.1 | 18.4 | 5.0 | 3.6 | 3.4 | 33.6 |
| Central governments | 16.4 | 13.3 | 1.7 | 0.8 | 0.1 | 0.8 | 0.0 | 40.9 |
| Non-credit institutions ⁽⁴⁾ | 60.1 | 43.5 | 5.7 | 4.3 | 0.6 | 0.7 | 1.3 | 19.9 |
| Total | 987.0 | 768.7 | 100.0 | 39.1 | 30.7 | 30.3 | 2.0 | 41.1 |
| Debt securities | | | | | | | | |
| Credit institutions | 80.2 | 63.7 | 21.3 | 0.1 | 12.7 | 8.5 | 1.7 | 55.4 |
| Corporate | 70.2 | 71.7 | 24.0 | 6.5 | 9.0 | 8.4 | 5.3 | 21.4 |
| Central governments | 136.6 | 156.7 | 52.5 | 16.1 | 28.9 | 7.4 | 0.2 | 66.7 |
| Non-credit institutions ⁽⁴⁾ | 8.9 | 6.6 | 2.2 | 0.2 | 0.9 | 1.1 | 0.8 | 96.4 |
| Total | 296.2 | 298.8 | 100.0 | 23.0 | 51.5 | 25.5 | 1.7 | 32.1 |

Sources: CBFA, NBB.

(1) Impaired claims (before allowances) as a percentage of total claims to the concerned loan or debt securities counterparty.

(2) Percentage of the value of impaired claims (before allowances) being covered by specific allowances for individually or collectively assessed financial assets.

(3) Including the loans and advances reported under "Held for Trading" (respectively 39.1 and 13.5 billion euro at the end of 2007 and 2008).

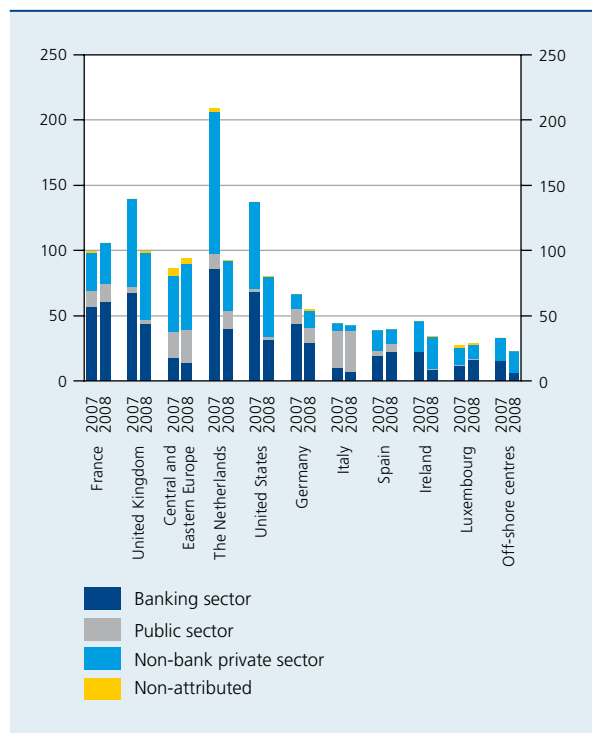
(4) The counterparty "Non-credit institutions" covers inter alia loans to financial institutions other than banks and to local government authorities.

declined by almost 220 billion euro or 22 p.c. in 2008. More than four-fifths of this decline can be attributed to the deconsolidation of Fortis Bank Nederland from Fortis Bank. The rest of the decline mainly resulted from a fall in loans and advances to credit institutions. As a result of the latter factor, which mainly affected loans to banks established outside the euro area, the share of interbank loans in total loans and advances declined to 27.7 p.c. (down from 32.5 p.c. in 2007). Loans and advances to corporates now account for 37.8 p.c. of the total, versus 31.8 p.c. in the year before, reflecting a rise in loans and advances to corporates situated in Belgium. Data from the Belgian corporate credit register suggest in this regard that the increased loans to Belgian corporates resulted partly from a greater actual use of credit lines, mainly by medium-sized and large corporations, since the third quarter of 2007. While loans and advances to retail clients in euro area countries other than Belgium dropped from 104 billion euro at the end of 2007 to 39 billion at the end of 2008 as a result of the dismemberment of the Fortis group, the exposures to retail clients in the rest of the world (including the exposures of subsidiaries in non euro area EU Member States and Turkey) rose from 20.9 billion euro to 27.9 billion euro.

It is in this retail category that the most significant deterioration appears to have taken place in the percentage of loans considered to be impaired, with a rise from 2.8 p.c. to 3.4 p.c. The percentage of impaired loans and advances for the corporate counterparty only rose from 2.3 p.c. to 2.4 p.c. Overall, the non-performing loan ratio for total loans and advances rose from 1.6 p.c. to 2.0 p.c. The coverage ratio of these loans stood at 41 p.c. in 2008, up from 32 p.c. in 2007.

The composition of the debt securities portfolio has been rebalanced towards government securities, whose share has risen from 46 p.c. to 52 p.c. Exposures to corporate debt securities, which include structured credit instruments, remained stable at around 70 billion euro. On the basis of the data published by Fortis Bank, KBC Bank and Dexia Bank Belgium, the uninsured exposure to these structured credit instruments – including in the form of derivatives – has declined from around 80 billion euro at the end of 2007 to around 55 billion euro (taking account of the more than 10 billion euro of assets that Fortis Bank will transfer to a defeasance SPV). Impairments on the debt securities issued by credit institutions related to the bond defaults of Lehman Brothers and the Icelandic banks.

CHART 16 BREAKDOWN OF BELGIAN BANKS' MAIN FOREIGN EXPOSURES, ACCORDING TO COUNTERPARTY
(billion euro)



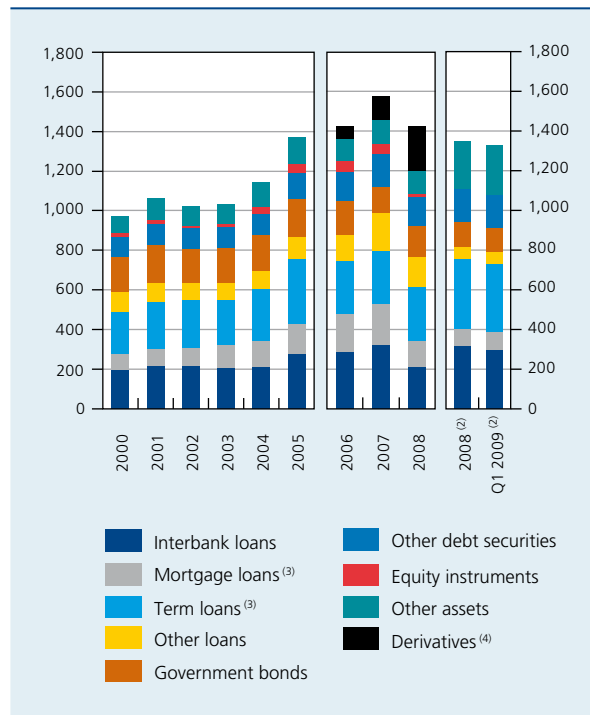
Sources: CBFA, NBB.

Chart 16 provides some more information on the foreign exposures of Belgian banks, broken down on an individual country or group basis, and according to the type of counterparty. The foreign claims shown in this chart cover exposures through both loans and debt securities. While the sharp decline in the claims on the Netherlands is obviously related to the deconsolidation of Fortis Bank Nederland, Belgian banks have also cut back on their exposures to US and UK residents, in both the banking and the non-bank private sector. These three countries nevertheless remain among the five largest foreign exposures, together with France and the group of Central and Eastern European countries. The most relevant exposures in this group of countries are further broken down in Chart 17, confirming the large exposures in countries where Belgian banks have developed activities through local subsidiaries such as the Czech Republic (29 billion), Poland (18 billion), Hungary (14 billion), Turkey (12 billion), Slovakia (9 billion) and Russia (6 billion). As discussed in section 1, the deteriorating economic conditions in some of these countries are likely to be associated with an increase in credit losses for banks. The remaining foreign claims of the Belgian banking sector that are shown in the chart are spread across Germany, Italy, Spain, Ireland, Luxembourg and off-shore centres.

While banks obviously incur counterparty credit risk in their loan and debt securities portfolios, many of their other commercial and financial activities also give rise

to current or potential future exposures on counterparties, through channels such as derivative transactions or guarantees, as was confirmed by the risk transmission channels through monoline insurance companies or by the heightened concerns over counterparty risks in the OTC-derivatives markets following the failure of Lehman Brothers and the difficulties experienced by AIG. In this connection, the breakdown and historical pattern of the Belgian banking sector's total assets shown in Chart 18 highlights a significant increase in the market value of derivatives, which are recognised as such on the balance sheet since the adoption of IAS/IFRS for the prudential consolidated accounts in 2006.⁽¹⁾ At the end of 2008, the total book value of derivatives on the assets' side of the balance sheet amounted to 223.1 billion euro. The significant growth of this exposure is mainly related to an increase in the market value of many derivatives (relative to their notional value), as large swings in the prices of the underlying referenced assets and/or high levels of volatility increased the Belgian banks' potential future claims on their counterparty in the context of such OTC-transactions. The management of these counterparty risks between professional counterparties within the financial sector relies heavily on principles of close-out netting of bilateral transactions – within ISDA

CHART 18 BREAKDOWN OF ASSETS⁽¹⁾
(end of period consolidated data, billion euro)



Sources: CBFA, NBB.

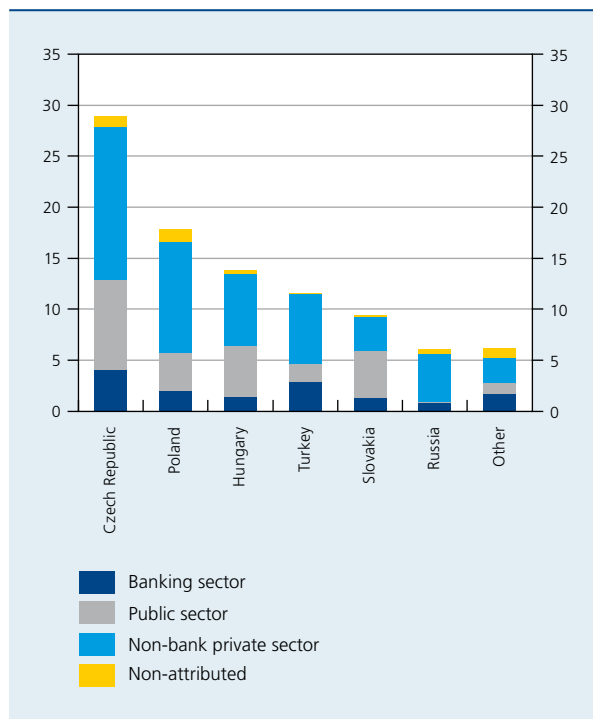
(1) Data compiled in accordance with the Belgian accounting standards until 2005 (Belgian GAAP) and according to the IAS/IFRS from 2006.

(2) Unconsolidated data, compiled in accordance with Belgian GAAP.

(3) Comprising only loans recorded at amortised cost.

(4) Derivatives recorded at their market value, including, as from 2007, the accrued income (which is not included in the figure reported for 2006).

CHART 17 BELGIAN BANKS' MAIN EXPOSURES ON EMERGING EUROPE
(billion euro)



Sources: CBFA, NBB.

Master Agreements – and, for the net exposures that remain, on the use of collateral to secure the claims on other counterparties. In order to further reduce potential risks related to these OTC-transactions, efforts have been undertaken to facilitate multilateral netting of these transactions or to move more of these transactions to clearing and exchange platforms so as to reduce counterparty risks. Some of these issues are discussed in more detail in the FSR article *A central counterparty solution for credit default swaps*.

The counterparty risks related to OTC-derivatives exposures on the assets' side of the balance sheet are among the exposures covered by the Pillar I minimum capital requirements for credit risk of the Basel II capital adequacy framework, which has progressively replaced the less risk-sensitive Basel I Accord since 2007, and

(1) As from 2007, the figure shown in the chart for derivatives includes the part of these exposures represented by accrued income. This accrued income includes, for example, the amounts of interest earned but not yet paid that are expected to occur in the next calendar year.

TABLE 6 BREAKDOWN OF THE EXPOSURE FALLING WITHIN THE SCOPE OF THE PILLAR I CAPITAL REQUIREMENTS FOR CREDIT RISK
(consolidated data, billion euro, unless stated otherwise)

| | Original exposure | On-balance-sheet items | Off-balance-sheet items | Securities financing transactions ⁽¹⁾ | OTC-derivatives | Exposure at default |
|--|--|------------------------|-------------------------|--|-----------------|---------------------|
| | Percentages of total original exposure | | | | | |
| Internal ratings-based approach | | | | | | |
| Central governments and central banks ⁽²⁾ | 181.9 | 10.8 | 1.6 | 0.4 | 0.2 | 186.7 |
| Institutions ⁽³⁾ | 400.3 | 14.6 | 3.6 | 6.3 | 4.0 | 410.2 |
| Credit institutions and investment firms | 369.9 | 13.2 | 2.9 | 6.3 | 4.0 | 383.3 |
| Other | 30.4 | 1.4 | 0.7 | | | 26.9 |
| Corporates ⁽⁴⁾ | 415.7 | 14.4 | 12.6 | 1.0 | 1.6 | 325.1 |
| SMEs | 57.0 | 2.7 | 1.3 | | | 46.6 |
| Other than SMEs | 358.7 | 11.7 | 11.3 | 1.0 | 1.6 | 278.6 |
| Retail ⁽⁵⁾ | 171.0 | 10.7 | 1.5 | | | 168.1 |
| Secured by real estate | 104.5 | 7.3 | 0.2 | | | 104.9 |
| Qualifying revolving | 0.3 | | | | | 0.3 |
| Other | 66.3 | 3.4 | 1.3 | | | 62.9 |
| <i>Subtotal</i> | <i>1,168.9</i> | <i>50.6</i> | <i>19.3</i> | <i>7.7</i> | <i>5.9</i> | <i>1,090.1</i> |
| Standardised approach | | | | | | |
| Institutions ⁽³⁾ | 28.9 | 1.5 | 0.2 | 0.3 | 0.1 | 23.6 |
| Corporates ⁽⁴⁾ | 73.7 | 3.2 | 1.6 | 0.1 | 0.3 | 54.3 |
| Other | 130.6 | 8.4 | 0.7 | 0.2 | | 120.5 |
| <i>Subtotal</i> | <i>233.2</i> | <i>13.1</i> | <i>2.5</i> | <i>0.5</i> | <i>0.4</i> | <i>198.5</i> |
| Total | 1,402.1 | 63.7 | 21.8 | 8.2 | 6.3 | 1,288.6 |

Sources: CBFA, NBB.

- (1) Including margin lending transactions and long settlement transactions. Securities financing transactions are transactions such as repurchase agreements, reverse repurchase agreements, security lending and borrowing, and margin lending transactions, where the value of the transactions depends on market valuations and the transactions are often subject to margin agreements. Margin lending transactions are transactions in which a bank extends credit in connection with the purchase, sale, carrying or trading of securities. Margin lending transactions do not include other loans that happen to be secured by securities collateral. Generally, in margin lending transactions, the loan amount is collateralised by securities whose value is greater than the amount of the loan.
- (2) At national discretion, claims on certain non-central government public sector entities may also be treated as claims on sovereigns if the country treats these claims as if they were central governments. In Belgium, this is the case for the governments of the Belgian regions and communities.
- (3) Institutions include banks and investment firms that are subject to supervisory and regulatory arrangements comparable to those under the Basel risk-based capital requirements. The other institutions include non-central government public sector entities and multilateral development banks.
- (4) The asset class corporates covers exposures to financial and non-financial firms, as well as specialised lending exposures, related to project finance, object finance, commodities finance, income-producing real estate and high-volatility commercial real estate. Within the corporate asset class, banks are permitted to distinguish separately exposures to small- and medium-sized entities (SMEs), which are corporations with sales of less than 50 million euro on a consolidated basis.
- (5) Concerning retail, a distinction is made between exposures that are secured by real estate, qualifying revolving retail exposures – which are small credit exposures to individuals that are revolving, unsecured and uncommitted –, and other loans which also comprise loans extended to small businesses that are managed as retail exposures. In the latter case, the total exposure of the banking group to a small business borrower has to be less than 1 million euro.

which applies to all banking assets as from 1 January 2008.⁽¹⁾ As shown in Table 6, these derivative exposures do indeed figure alongside on-balance exposures, off-balance exposures and securities financing transactions in the total amount of original exposures taken into account in the Pillar I requirements for credit risk. While the Basel I capital adequacy regime also recognised that credit risks do not only materialise in traditional loans or debt securities, but also stem from undrawn liquidity lines, guarantees or derivatives, the current Basel II framework has improved the treatment of some of these exposures in a number of respects (e.g. the treatment of short-term liquidity lines).

(1) In 2006, the regulatory solvency requirements applicable to Belgian banks were still calculated on the basis of the Basel I Capital Accord and its 1996 Amendment to incorporate market risk. With the implementation of the EU's Capital Requirements Directive on 1 January 2007, this regulatory regime was progressively replaced by the prudential framework of the Basel II Accord, which was finalised in June 2004, but also takes into account the BCBS-IOSCO document on "The Application of Basel II to Trading Activities and the Treatment of Double Default Effects" (July 2005). This new framework is based on three pillars: the quantification of the market, credit and operational risks arising from an institution's activities (Pillar 1), the obligation on financial institutions to develop strategies and processes in order to ensure that they always have adequate internal capital to cover their actual and potential risks (Pillar 2), and a series of public disclosure requirements imposed on firms to encourage a stronger role for market discipline (Pillar 3). In response to the financial crisis, the Basel Committee on Banking Supervision has taken a number of initiatives intended to produce a more robust supervisory and regulatory framework. These efforts, which also are in support of the initiatives and recommendations of the Financial Stability Forum and the G20, focus *inter alia* on a better coverage of banks' risk exposures, including for trading book, securitisation, and derivative activities; more and higher quality capital to back these exposures; countercyclical capital buffers and provisions that can be built up in good times and drawn down in stress; the introduction of a non-risk based measure to supplement Basel II and help contain leverage in the banking system; higher liquidity buffers; stronger risk management and governance standards; more regulatory focus on system-wide or "macroprudential" supervision; and greater transparency about the risk in banks' portfolios.

The table provides an overview of the relative importance of four main types of credit instruments, based on the value of the original exposure, as defined in the framework. Generally speaking, for on-balance transactions, this original exposure value is equal to the carrying amount of the instrument on the balance sheet. The same applies to the off-balance credit exposures, which cover *inter alia* the undrawn portions of credit lines, the guarantees extended to third parties and the credit protection sold through credit default swaps. As regards other derivatives, the original exposure is based on the current market (or marked-to-market) value, excluding, however, the accrued income component. A similar principle applies to the securities financing transactions, which basically cover reverse repo's and similar operations.

The table reports original exposures according to the different treatment they will subsequently receive in the calculation of the appropriate risk weights, distinguishing between the internal ratings-based approach (IRB) and the standardised approach. Whereas both portfolios are similar in the classes of assets taken into consideration, they differ in their translation of these exposures into provisions and capital requirements, as will be discussed further in this section. Of the total original exposures, 83 p.c. comes under the IRB approach. The large Belgian banking groups tend to use the IRB approach, in combination with the standardised approach for certain portfolios.

The original exposures coming under the IRB and the standardised approaches are shown in the table for different classes of assets, distinguishing between claims on central governments and central banks, claims on credit institutions and investment firms, corporate claims and retail claims. For some of these asset classes, further subdivisions are available.

The table also provides, for each of these (sub-)asset classes, the amount of the original exposure for the four main types of credit instruments defined above. Of the total original exposure of 1402.1 billion euro that comes under either the IRB or standardised approach, almost two-thirds (63.7 p.c.) derive from on-balance sheet items in the banking book. Slightly more than one-fifth (21.8 p.c.) of the total original exposures is accounted for by off-balance sheet items, with the other two credit instruments – securities financing transactions and OTC-derivatives – representing respectively 8.2 p.c and 6.3 p.c. of the total. There are some significant differences between the asset classes, however, in the relative importance of these credit instruments. For the claims on central governments and central banks and the retail claims, most of the original exposures are on-balance-sheet items. Original exposures for the claims on credit

institutions and investment firms and for corporate claims are distributed more widely across the different types of credit instruments, with off-balance-sheet items being of particular importance for corporate claims. Most of the original exposures derived from securities financing transactions and OTC-derivatives concern claims on credit institutions and investment firms. Given that financial sector firms such as hedge funds and insurance companies are often also counterparties in securities financing transactions and derivatives contracts, some of the original exposure in these credit instruments can also be found within the corporate asset class.

These original exposures are the starting point of a complex risk-weighting mechanism that, in the end, calculates for each exposure an amount of financial reserves that banks have to provide in order to absorb both the expected loss (to be covered by provisions) and the possibility of higher than expected losses (unexpected loss) through capital buffers. The first step in this process is the transformation of the original exposures into what is called the exposure at default.

Instead of risk weighting the original exposure, Basel II risk-weights the so-called exposure at default (EAD), which is the expected exposure outstanding if and when a counterparty defaults. The transformation of the original exposures into exposures at default has a significant impact in the case of off-balance-sheet items, securities financing transactions and derivatives. Off-balance-sheet items are converted into credit exposure equivalents through the use of credit conversion factors (CCFs). These CCFs, which exist for various types of off-balance-sheet items, represent the expected percentage of the original exposure that will have been converted into an on-balance-sheet exposure by the time of default. The application of these CCFs to off-balance-sheet items thus generally results in a reduction of the exposures taken into account in the risk-weighting process. This is in contrast to the treatment of derivatives transactions, where the transformation of original exposures into EADs can result in a higher exposure amount entering the risk-weighting process. Basel II does in fact recognise that the original exposure to derivatives might increase by the time of default because of asset price movements and volatility. Other factors affecting the calculation of EADs are netting agreements and substitution effects. Concerning the former, Basel II recognises that netting agreements reduce the counterparty credit risks at the time of default. Concerning the latter, exposures can be substituted between counterparty categories because of credit protection arrangements such as guarantees and credit derivatives. For instance, when a corporate exposure is guaranteed by a bank, and substitution is applied,

Box 4 – The standardised approach

Basel II allows credit institutions to risk-weight exposures taking into account either internal or external assessments of creditworthiness. This is an important difference compared to the Basel I approach, which did not discriminate between the relative creditworthiness of individual debtors within one asset class. Under the standardised approach, exposures are assigned credit ratings from acknowledged external credit rating agencies – which should be objective, independent, credible third parties with sufficient resources to monitor and disclose information on the creditworthiness of exposures. The table gives a general breakdown of the risk weights by asset class and credit rating.

Risk weights are reduced when exposures are either collateralised, netted, guaranteed or protected by credit derivatives in as far as these credit risk mitigants carry legal and economic certainty.

BREAKDOWN OF THE RISK WEIGHTS IN THE STANDARDISED APPROACH BY ASSET CLASS AND CREDIT RATING

(percentages)

| | AAA to AA– | A+ to A– | BBB+ to BBB– | BB+ to B– (to BB– for corporates) | Below B– (below BB– for corporates) | Unrated |
|-------------------------|---|----------|--------------|---|---|---------|
| Sovereigns | 0 | 20 | 50 | 100 | 150 | 100 |
| Banks | | | | | | |
| Option 1 ⁽¹⁾ | 20 | 50 | 100 | 100 | 150 | 100 |
| Option 2 | | | | | | |
| > 3 months | 20 | 50 | 50 | 100 | 150 | 50 |
| ≤ 3 months | 20 | 20 | 20 | 50 | 150 | 20 |
| Corporates | 20 | 50 | 100 | 100 | 150 | 100 |
| Retail ⁽²⁾ | 75 (general rule) | | | | | |
| | 35 (secured by residential property) | | | | | |
| | 100 (secured by commercial real estate) | | | | | |

Source: Basel Accord.

(1) National supervisors choose either option 1 or 2 for all banks in their jurisdiction. Under option 2, risk weights are generally lower for claims with an original maturity of less than 3 months.

(2) Retail exposures are unrated.

this exposure will be booked as an institution's exposure at default. The EADs for Belgian banks do not seem to be greatly affected by such substitution effects.

In the next step, the Basel II capital accord details how the EADs should be risk-weighted and translated into provisions against expected losses and capital buffers against unexpected losses. These calculations differ significantly between the standardised and IRB approaches.

Within the Standardised approach, exposures are treated on the basis of pre-defined risk weights that vary in accordance with the asset class and, if available, external

assessments of the counterparty's creditworthiness. The table in Box 4 gives an overview of these risk weights, according to the asset class and external credit rating (based on the S&P credit rating scale). The minimum capital requirement under the Standardised approach is calculated as the product of the EAD, the appropriate risk weight and 8 p.c.

The Internal ratings-based (IRB) approach goes further in the differentiation of risk between individual debtors, allowing banks to use internal estimates of important risk parameters in the determination of the appropriate risk weight. The ability to use such a more sophisticated

TABLE 7 BREAKDOWN OF THE IRB-RELATED RISK-WEIGHTED ASSETS AND OF THE MINIMUM CAPITAL REQUIREMENTS AS A PERCENTAGE OF ORIGINAL EXPOSURE

(consolidated data)

| | Original exposure | | Minimum capital requirement | Risk-weighted assets |
|--|-------------------|---------------|-----------------------------|----------------------|
| | billion euro | p.c. of total | p.c. of original exposure | p.c. of total |
| Central governments and central banks ⁽¹⁾ | 181.9 | 15.6 | 0.2 | 1.7 |
| Institutions ⁽²⁾ | 400.3 | 34.2 | 1.0 | 20.1 |
| Credit institutions and investment firms | 369.9 | 31.6 | 1.1 | 19.3 |
| Other | 30.4 | 2.6 | 0.5 | 0.7 |
| Corporates ⁽³⁾ | 415.7 | 35.6 | 3.2 | 66.3 |
| SMEs | 57.0 | 4.9 | 3.7 | 10.4 |
| Other than SMEs | 358.7 | 30.7 | 3.2 | 56.0 |
| Retail ⁽⁴⁾ | 171.0 | 14.6 | 1.3 | 11.9 |
| Secured by real estate | 104.5 | 8.9 | 1.1 | 5.5 |
| Qualifying revolving | 0.3 | 0.0 | 3.0 | 0.0 |
| Other | 66.3 | 5.7 | 1.9 | 6.2 |
| Total | 1,168.9 | 100.0 | 1.7 | 100.0 |

Sources: CBFA, NBB.

- (1) At national discretion, claims on certain non-central government public sector entities may also be treated as claims on sovereigns if the country treats these claims as if they were central governments. In Belgium, this is the case for the governments of the Belgian regions and communities.
- (2) Institutions include banks and investment firms that are subject to supervisory and regulatory arrangements comparable to those under the Basel risk-based capital requirements. The other institutions include non-central government public sector entities and multilateral development banks.
- (3) The asset class corporates covers exposures to financial and non-financial firms, as well as specialised lending exposures, related to project finance, object finance, commodities finance, income-producing real estate and high-volatility commercial real estate. Within the corporate asset class, banks are permitted to distinguish separately exposures to small- and medium-sized entities (SMEs), which are corporations with sales of less than 50 million euro on a consolidated basis.
- (4) Concerning retail, a distinction is made between exposures that are secured by real estate, qualifying revolving retail exposures – which are small credit exposures to individuals that are revolving, unsecured and uncommitted –, and other loans which also comprise loans extended to small businesses that are managed as retail exposures. In the latter case, the total exposure of the banking group to a small business borrower has to be less than 1 million euro.

approach in the management of credit risk is subject to a number of stringent conditions and to supervisory approval. Box 5 explains how credit risks are treated in the IRB approaches.

Table 7 highlights for each type of counterparty recorded in the Belgian banking sector's IRB portfolios the total amount of original exposures, both in absolute terms (column 1) and as a percentage of total exposure (column 2). The third column expresses the total minimum required capital – resulting from the IRB calculations – as a percentage of the total amount of the original exposures for that type of counterparty (i.e. before risk weighting). Column 4 reports the risk-weighted assets (RWA) as a proportion of total RWA.

As a result of the quantified differences in credit risks of the different counterparties, as well as the availability of collateral to secure credit exposures, the risk weights applied to different types of counterparties appear to be significantly different. Minimum capital requirements as a percentage of original exposures do indeed differ

significantly from one counterparty type to the other (column 3). They are lowest for central governments and central banks, where only 0.2 euro of capital needs to be held against unexpected losses on a 100 euro credit. They are highest for SMEs where 3.7 euro of capital needs to be held against unexpected losses on a 100 euro credit. Because of these differences in assessed creditworthiness, the differences between the distribution of original exposure (column 2) and of risk-weighted assets (column 4) are large for all categories.

As shown in Box 5, the probability of default, being the probability that a counterparty will default within a one-year horizon, is an important risk parameter for the determination of provisions against expected losses and capital buffers against unexpected losses. Banks using an IRB approach determine this probability on the basis of internal estimations.

Table 8 shows, for the different types of asset classes, the percentage of total exposures at default (EAD) that has a probability of default (PD) of less than 0.5 p.c. and

TABLE 8 IRB-RELATED ESTIMATES OF PROBABILITIES OF DEFAULT AND LOSS GIVEN DEFAULT PER ASSET CLASS
(consolidated data for the four main banking groups at the end of 2008)

| | Exposure at default (EAD) with associated probabilities of default lower than | | | | Average estimated loss given default (percentages) |
|--|---|-------------------|--------------|-------------------|--|
| | 0.5 p.c. | | 2.0 p.c. | | |
| | billion euro | p.c. of total EAD | billion euro | p.c. of total EAD | |
| Central governments and central banks ⁽¹⁾ | 183.1 | 99.3 | 184.0 | 99.8 | 26.3 |
| Institutions ⁽²⁾ | 376.4 | 95.6 | 388.4 | 98.6 | 23.1 |
| Credit institutions and investment firms | 350.2 | 95.5 | 362.0 | 98.6 | 24.4 |
| Other | 26.1 | 97.6 | 26.4 | 98.2 | 7.8 |
| Corporates ⁽³⁾ | 191.2 | 60.6 | 277.0 | 85.3 | 34.6 |
| SMEs | 19.7 | 44.2 | 36.0 | 77.3 | 37.2 |
| Other | 171.5 | 63.3 | 241.0 | 86.7 | 34.2 |
| Retail ⁽⁴⁾ | 78.4 | 55.1 | 125.8 | 81.3 | 18.4 |
| Secured by real estate | 50.5 | 60.7 | 81.4 | 86.4 | 10.5 |
| Qualifying revolving | 0.4 | 34.8 | 0.8 | 68.3 | 44.6 |
| Other | 27.5 | 48.4 | 43.7 | 73.1 | 29.9 |

Sources: CBFA, NBB.

- (1) At national discretion, claims on certain non-central government public sector entities may also be treated as claims on sovereigns if the country treats these claims as if they were central governments. In Belgium, this is the case for the governments of the Belgian regions and communities.
- (2) Institutions include banks and investment firms that are subject to supervisory and regulatory arrangements comparable to those under the Basel risk-based capital requirements. The other institutions include non-central government public sector entities and multilateral development banks.
- (3) The asset class corporates covers exposures to financial and non-financial firms, as well as specialised lending exposures, related to project finance, object finance, commodities finance, income-producing real estate and high-volatility commercial real estate. Within the corporate asset class, banks are permitted to distinguish separately exposures to small- and medium-sized entities (SMEs), which are corporations with sales of less than 50 million euro on a consolidated basis.
- (4) Concerning retail, a distinction is made between exposures that are secured by real estate, qualifying revolving retail exposures – which are small credit exposures to individuals that are revolving, unsecured and uncommitted –, and other loans which also comprise loans extended to small businesses that are managed as retail exposures. In the latter case, the total exposure of the banking group to a small business borrower has to be less than 1 million euro.

2.0 p.c. as at the end of December 2008. For central governments, more than 99 p.c. of exposures have an internal PD of less than 0.5 p.c.. This helps to explain why the capital requirements are very low for this type of exposures. Also, for institutions, including regulated banks and local authorities, the probability of default is low, as 95.6 p.c. of exposures have a PD of less than 0.5 p.c. Corporate exposures bear more credit risk as 39.4 p.c. have a PD larger than 0.5 p.c. with 14.7 p.c. a PD larger than 2 p.c. The table also confirms that SMEs are characterised by high levels of PD (although this does not necessarily imply an equivalent high unexpected loss or minimum capital charge: cf. the discussion in the Box). Retail exposures

have the highest probabilities of default, with 44.9 p.c. of exposure at default having a PD of more than 0.5 p.c., and 18.7 p.c. having a PD of more than 2 p.c. Other retail exposures, which contain amongst others loans to small businesses and consumers, have particularly high PDs.

Banks qualifying for the advanced IRB approach are also allowed to estimate internally the loss given default (LGD), which is the fraction of the exposure that banks are on average unable to recover upon default. Collateral can be taken into account, reducing the resulting LGD. The table shows the overall LGD of different asset classes for the four biggest Belgian banking groups.

Box 5 – The internal ratings-based approach

For portfolios coming under the internal ratings-based approach, Basel II details the treatment of both expected and unexpected credit losses. It prescribes the amount of provisions to make against expected losses, and the

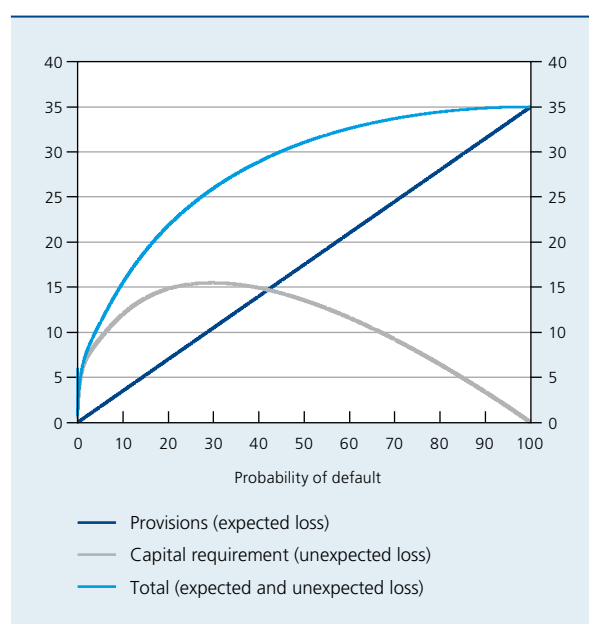


amount of capital buffers to hold against unexpected losses, dependent on the following risk parameters:

- Exposure at default (EAD): What is the maximum potential loss at the time of default?
- Probability of default (PD): What are the odds that a creditor defaults⁽¹⁾ on a certain type of contract?
- Loss given default (LGD): How much is lost, on average, when a creditor defaults on a certain type of contract?
- Maturity (M): How long does it take before the loan is repaid?
- Size (S): How large is the company?
- Correlation (R): What is the correlation of credit defaults?

MINIMUM PROVISION AND CAPITAL REQUIREMENTS IN FUNCTION OF THE PROBABILITY OF DEFAULT

(percentages of exposure at default, example for corporate claim with loss given default of 35 p.c.)



Provisions should cover expected losses, calculated as the product of EAD, LGD and PD. Capital buffers should be sufficient to cover unexpected losses of at least 8 p.c. of the product of the EAD and the risk weights, which are the output of risk weight functions. These risk weight functions, supplied by the Basel II accord, use the above-mentioned risk parameters as inputs. The possible outcomes of such a risk-weighting process are shown in the chart above, which expresses the Basel II minimum provision and capital requirements (as a percentage of EAD) according to different levels of the probability of default for the case of a large corporate exposure with an estimated LGD of 35 p.c. and a maturity of 2.5 years. In this example, a shift in PD from 1 p.c. to 2 p.c. results in a shift in the minimum required provision for expected loss (EL) from 0.35 p.c. to 0.7 p.c. of EAD and a shift in the minimum capital requirement for unexpected loss (UL) from 5.7 p.c. to 7.1 p.c. of EAD.

Changes in the risk parameters other than the probability of default can also affect the level of the minimum provision and capital requirements. The next chart illustrates the effect of two different levels for the parameter loss given default. It shows that a higher LGD tilts upwards both the linear expected loss curve and the non-linear unexpected loss curve. Further exploring our previous example, for an LGD of 50 p.c. instead of 35 p.c., the minimum

(1) A default is considered to have occurred when either the bank considers that the obligor is unlikely to pay its credit obligations to the banking group in full, or when the obligor is more than 90 days overdue on any material credit obligation to the banking group. For retail exposures, the definition of default can be applied at the level of a particular facility, rather than at the level of the obligor.

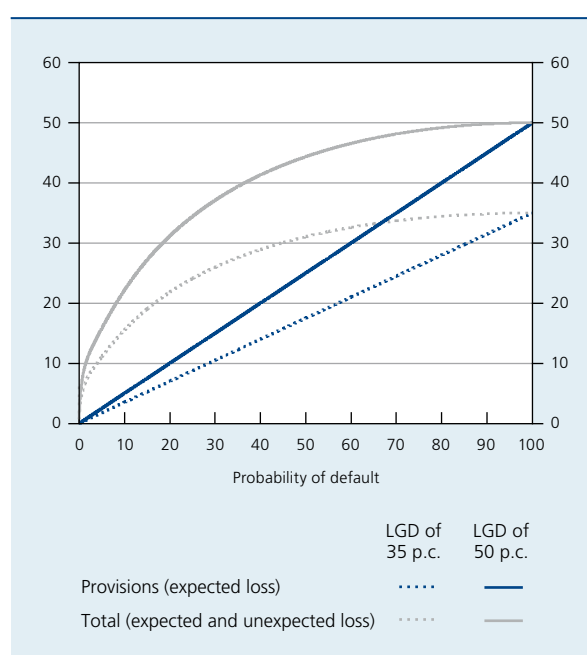


provision and capital requirements are higher at respectively 0.5 p.c. and 8.2 p.c. (versus 0.35 p.c. and 5.7 p.c. in the case of an LGD of 0.35 p.c.). An increase in the probability of default from 1 p.c. to 2 p.c. now results in a shift in provisions from 0.5 p.c. to 1.0 p.c. and a shift in regulatory capital requirements from 8.2 p.c. to 10.2 p.c.

To counteract potential cyclical effects in the calculation of capital requirements, credit risk parameters must be conservative, based on economic or market conditions that are relevant to current and foreseeable conditions, and must be "through-the-cycle" estimates instead of "point-in-time estimates" (e.g. PDs should be long-run averages

MINIMUM PROVISION AND CAPITAL REQUIREMENTS IN FUNCTION OF THE PROBABILITY OF DEFAULT FOR TWO DIFFERENT LEVELS OF LOSS GIVEN DEFAULT

(percentages of exposure at default, example for corporate claim)



of one-year default rates). This implies that we should only see an upwards revision of current PDs and LGDs⁽¹⁾ in so far as the current market conditions deviate from the expected "through the cycle" market conditions when these parameters were established for the relevant exposures. Another important assumption is that portfolios are well-diversified with a high granularity (otherwise defaults will be more correlated than assumed by the risk weight function, leading to a too low minimum capital requirement for the portfolio concerned).

Conditional on supervisory approval and subject to continuous monitoring, banks using IRB models are allowed to estimate one or more risk parameters. Banks that qualify for the Foundation IRB (FIRB) approach, can estimate PDs internally. Banks qualifying for the Advanced IRB (AIRB) approach can also estimate LGD, EAD and M. Credit risk mitigation, either through guarantees, credit derivatives or collateral, is incorporated in the calculations through modifications to inputs of the risk weight function (for instance PD or LGD).

(1) The Basel II accord stipulates that a bank must estimate a LGD that aims to reflect economic downturn conditions where necessary to capture the relevant risks. This LGD cannot be less than the long-run default-weighted average loss rate for that type of facility. In addition, a bank must take into account the potential for the LGD to be higher than the default-weighted average during a period when credit losses are substantially higher than average. For this purpose, banks may use averages of loss severities observed during periods of high credit losses, forecasts based on appropriately conservative assumptions, or other similar methods. LGD estimates must be grounded in historical recovery rates and, when applicable, must not be based solely on the collateral's estimated market value.



Whereas the risk weight functions themselves have a lot of similarities across asset classes, the risk parameters vary widely across asset classes, resulting in substantial differences in capital requirements. The equation below gives a general example of the Basel II credit risk weight function.⁽¹⁾

$$\text{Capital Requirements} = [LGD * N[(1-R)^{-0.5} * G(PD) + (R)^{0.5} * G(0,999)] - PD * LGD] * (1 - 1,5 * ((0,11852 - 0,05478 * \ln(PD))^2))^{-1} * (1 + (M - 2,5) * (0,11852 - 0,05478 * \ln(PD)^2))$$

An important parameter predefined by Basel II, which differs across asset classes, is the correlation (R). The correlation between two exposures is higher when both are vulnerable to a common risk factor. The higher this vulnerability, the higher the probability that both will default when this risk materialises, and the more difficult it is to diversify away this risk. Therefore, asset classes that are less vulnerable to common risk factors should receive a lower risk weight. This explains why Basel II prescribes a lower correlation for SMEs in comparison to large companies. Even though SMEs generally have a higher average PD, a larger proportion of this risk is considered firm specific. Therefore, given that SMEs are considered less sensitive to common macro-economic shocks than are large companies, Basel II attaches a lower correlation to SME exposures. Whereas the correlation for large corporates can vary between 12 p.c. and 24 p.c., the correlation for SMEs varies between 8 p.c. and 24 p.c.

(1) N(x) denotes the cumulative distribution function for a standard normal random variable (i.e. the probability that a normal random variable with mean zero and variance of one is less than or equal to x). G(z) denotes the inverse cumulative distribution function for a standard normal random variable (i.e. the value of x such that N(x) = z).

2.4 Liquidity and interest rate risk

In addition to credit risk – the focus of attention in the previous section – banks also face and have to manage a number of other important risks. Yet the quantitative minimum capital requirements of Pillar I of the Basel Accord do not (and have no intention to) provide an all-encompassing quantification of the banks' risk exposures. In addition to credit risk, they additionally cover market risk in the trading book (though with some exceptions) and operational risk (Chart 19). Market risk is defined as the risk of losses in on- and off-balance-sheet positions arising from movements in market prices. These include the risks pertaining to interest rate related instruments and equities in the trading book and foreign exchange and commodities risk throughout the bank. The operational risk requirements try to capture the risk of losses resulting from inadequate or failed internal processes, people and systems or from external events, whereby banks can choose between different measurement approaches to arrive at the minimum capital charge.

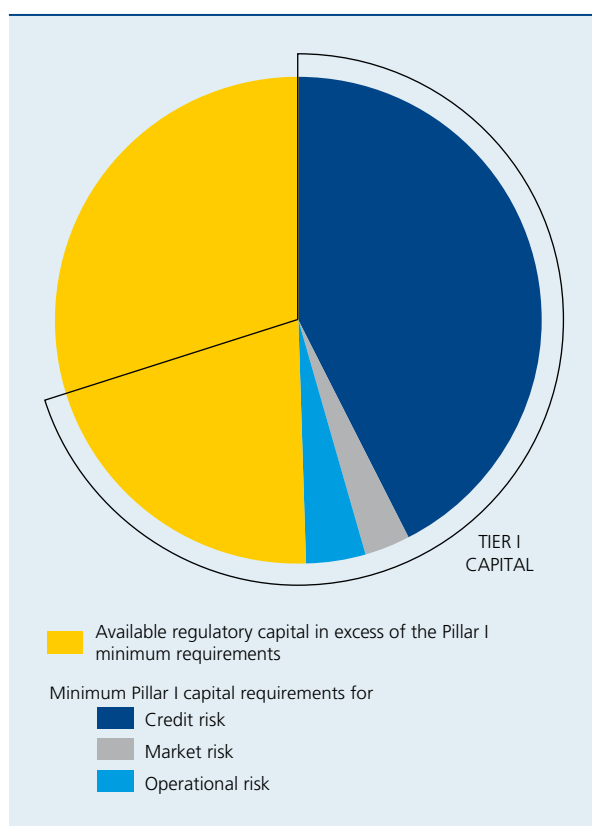
Two main sources of risk not covered in Pillar I are liquidity risk and interest rate risk in the banking book. In order to complement the risk assessments performed in Pillar I, banks are thus required to develop, in the context of Pillar II, an Internal Capital Adequacy Assessment Process (ICAAP). In this ICAAP, banks have to provide a holistic

view and measurement of all the risks to which they are exposed, providing the basis for assessing required management actions and the adequacy of available capital buffers. Such an "economic capital" approach is an important complement to the quantitative requirements of Pillar I, as the latter does not capture all the risks to which banks are exposed. One can highlight in this connection liquidity risk, interest rate risk in the banking book or concentration risks as important areas of attention in the Pillar II. The importance of these non-Pillar I risks – as highlighted as well in economic capital calculations provided by banks – also has to be taken into account when assessing the adequacy of Belgian banks' capital buffers, over and above the minimum requirements for the risks covered in Pillar I.

2.4.1 Liquidity risk

The seizure of important professional (re)financing markets in the immediate aftermath of the Lehman Brothers failure was the main vehicle transmitting the financial market tensions to the Belgian banking sector in the second half of September. This funding and market liquidity shock came after a period during which a strong growth in the Belgian banking sector's aggregate balance sheet had taken place, rising from 1033 billion euro at the end of 2003 to 1578 billion euro at the end of 2007 (Chart 20).

CHART 19 BREAKDOWN OF AVAILABLE REGULATORY CAPITAL
(consolidated data at the end of 2008)



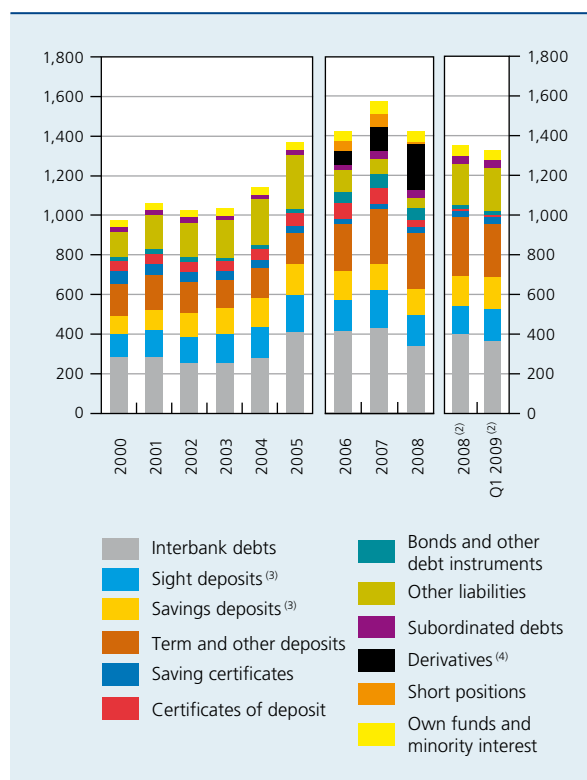
Sources: CBFA, NBB.

During this period of strong balance sheet growth, the share of – retail and wholesale – deposit funding remained stable at two-thirds of the total balance sheet. Within this total, interbank funding transactions accounted for about a quarter of the total balance sheet funding, whereby the almost equally important debt securities portfolio on the assets' side of the Belgian banking sector was actively used to obtain secured financing in the professional or wholesale funding markets. Judging by the relative weight of (central) government bonds in the total debt securities portfolio – which declined from almost two-thirds in 2003 to slightly less than half in 2007 –, the average intrinsic market liquidity resilience of the debt securities available declined during this period. Given the abundant funding and market liquidity conditions in global financial markets in the years before 2007, a large variety of non-government debt securities could nevertheless be used in repo(-like) transactions with small haircuts and a low funding cost during the years of strong balance sheet growth between 2003 and 2007.

Following the collapse of Lehman Brothers, certain non-prime collateral securities were no longer accepted as loan collateral, or only on far less favourable conditions, and unsecured interbank funding markets dried up, as described in section 1. While some thawing has occurred in these markets from the highly stressed levels observed in October and November, unsecured interbank markets continue to be dominated by short-maturity financing and non-prime collateral is generally not yet accepted in secured financing transactions. Chart 21 confirms in this connection that the four main Belgian banks obtained significantly less unsecured financing from other credit institutions as a percentage of total interbank loans in the last quarter of 2008, relative to the situation at the end of June 2008.

Total interbank deposits, including deposits from central banks, declined from 409 billion euro at the end of 2007 to 319 billion euro at the end of 2008. This sharp

CHART 20 BREAKDOWN OF LIABILITIES ⁽¹⁾
(end of period consolidated data, billion euro, unless otherwise stated)

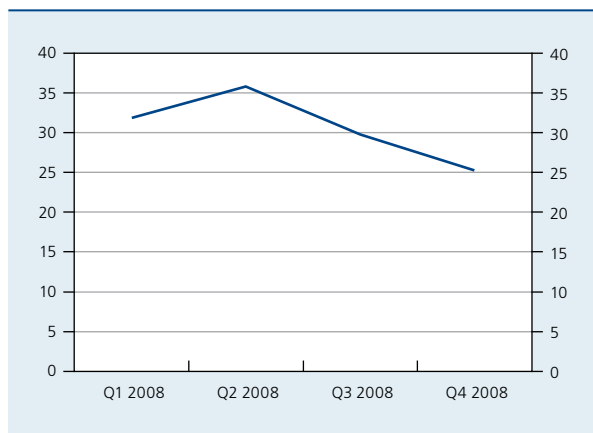


Sources: CBFA, NBB.

(1) Data compiled in accordance with the Belgian accounting standards until 2005 (Belgian GAAP) and according to the IAS/IFRS from 2006.
 (2) Unconsolidated data, compiled in accordance with Belgian GAAP.
 (3) Comprising only deposits recorded at amortised cost.
 (4) Derivatives recorded at their market value, including, as from 2007, the accrued expenses (which is not included in the figure reported for 2006).

CHART 21 UNSECURED WHOLESALE FUNDING MATURING WITHIN ONE YEAR

(unconsolidated end of period data, percentages of total interbank loans, four main Belgian banks)



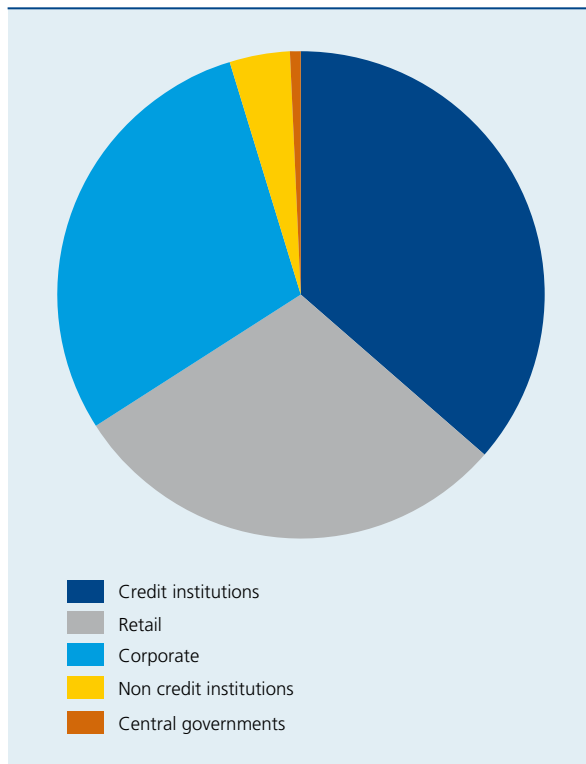
Sources: CBFA, NBB.

decline reflected to a large extent the deconsolidation of Fortis Bank Nederland in the last quarter of 2008 (as discussed already in the context of developments in Belgian banks' assets) and brought the relative share of interbank deposits in the total deposits booked at amortised cost (876.4 billion euro) back to 36 p.c. (Chart 22). At the end of 2008, the other main types of deposits were corporate and retail deposits, each having a share of around 29 p.c.

Chart 23 breaks down the development of these deposits from customers, which include both retail and wholesale deposits, since 2003. The chart highlights the important role played by significant changes in the remuneration of different types of deposits in driving allocations of deposit funds between term deposits and savings deposits since the middle of 2006. Between 2006 and the first half of 2008, rising interest rates on term deposits, relative to the rate offered by banks on regulated savings deposits, contributed to a decline in the outstanding amount of the latter. To counter these flows from savings deposits to the more expensive term deposits, yields on savings deposits were raised in the summer of 2008. In the fourth quarter of last year, the gap between the remuneration of term and savings deposits disappeared, however, as term deposits dropped in line with the sharp decline in market interest rates while savings deposits yields adjusted to a much lesser extent. In the first months of 2009, the outstanding amount of savings deposits had recovered to the level reached in 2006.

CHART 22 BREAKDOWN OF DEPOSITS ⁽¹⁾

(consolidated data, at the end of 2008)



Sources: CBFA, NBB.

(1) Deposits valued at amortised cost.

The popularity of regulated savings deposits stems mainly from the favourable fiscal treatment of interest payments on these deposits, which are exempted from the fully discharging withholding tax (currently 15 p.c.) up to an amount of 1,660 euro of annual interest income per taxpayer. In order to benefit from this fiscal exemption, a Royal Decree of 1992 specified a number of conditions, including stipulations on the accounts' remuneration, by using a compulsory, tiered remuneration structure that must exclusively consist of a base deposit rate (legally capped at 4 p.c.) and a growth or a loyalty premium (both capped at 2 p.c.). In the summer of 2008, the federal government raised the statutory ceiling to 4.25 p.c., pending a more in-depth review of the legislation on regulated savings accounts. As the previous system made no provision for any automatic adjustment of the ceiling on the base interest rate paid on regulated savings accounts, it was decided by royal decree that the ceiling for the base interest rate should henceforth be more aligned on money market conditions. With effect from 1 April 2009, the cap on the base interest rate on savings deposits is the higher of the following two rates, namely 3 p.c. or the Eurosystem's key policy interest rate prevailing on the 10th of the month preceding the current calendar half-year.

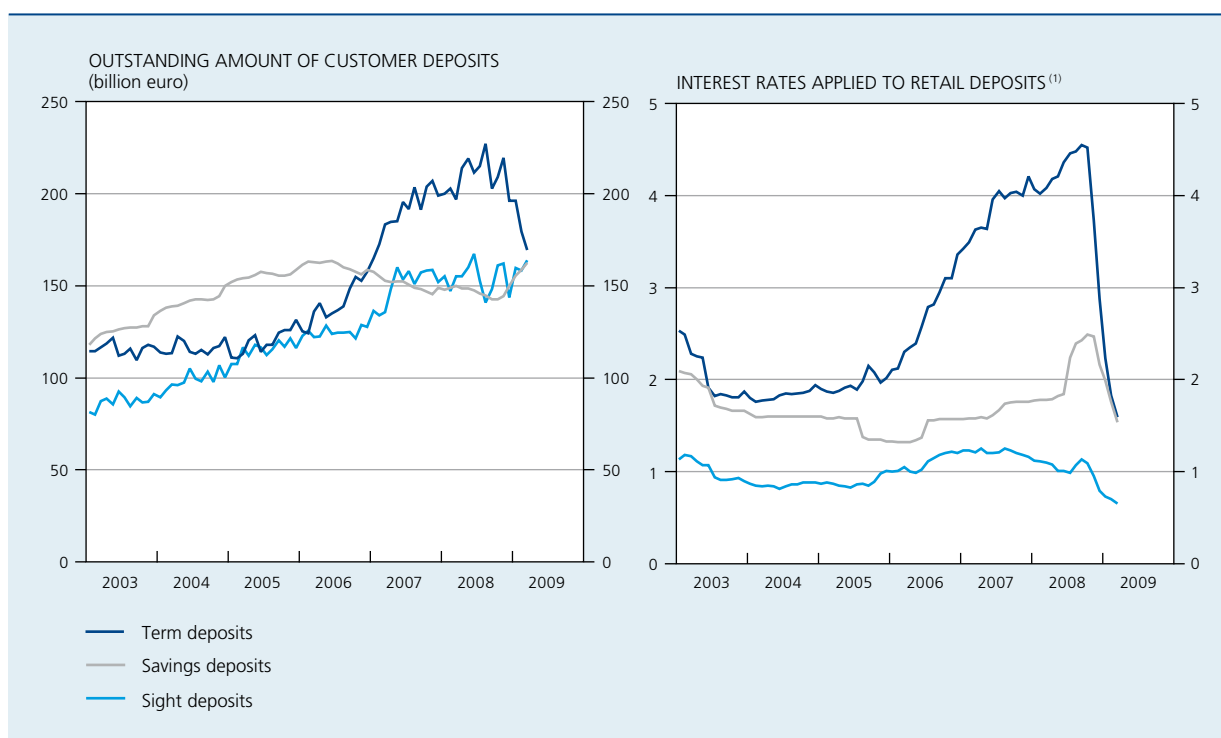
Since then, the ceiling for the base interest rate has thus amounted to 3 p.c. The reform also changed the premiums supplementing the base rate. The growth premium has been abolished, leaving only the loyalty premium, paid on amounts held in the same account for twelve consecutive months, or per calendar year on amounts held in the same account for at least eleven consecutive months in that same calendar year. The rate of this premium may be set at between 25 p.c. of the base rate offered and 50 p.c. of the maximum base rate.

While comparatively much less than in the case of deposits, Belgian banks also had relied for their funding of a rising balance sheet on the issuance of certificates of deposit, bonds and other debt certificates. At the end of 2007, these instruments had an outstanding amount of 152 billion EUR, equivalent to 11 p.c. of total liabilities. The markets for these forms of market borrowing dried up in the immediate aftermath of the failure of Lehman Brothers, posing problems for institutions having to roll-over financing in these markets. This stress culminated into a substantial decline in the outstanding amount of Belgian banks' liabilities in the form of certificates of deposit (by 44 billion euro to 38 billion at the end of

2008), which tend to have shorter contractual maturities than bonds and other debt certificates, where the decline was limited to 14 billion. The total outstanding for the latter was 57 billion euro at the end of 2008. In order to alleviate market concerns over bank counterparty risk, and help banks renew their access to these markets, many countries, including Belgium, established schemes allowing to attach government guarantees to such issues, as already mentioned in section 1 and Box 2. In Belgium, only Dexia group has used this possibility. As of 13 May 2009, the outstanding amount of its liabilities covered by the above-mentioned Belgo-French-Luxembourg guarantee scheme came to 92.6 billion euro, including as well unsecured interbank deposits.

In addition to the reduced or tighter access to traditional funding markets, Belgian banks' liquidity needs may also have increased as a result of margin calls in the context of derivatives transactions or off-balance guarantees. As shown in chart 20, echoing the development on the assets' side, the mark-to-market value of derivatives on the liabilities' side of Belgian banks' balance sheet expanded by no less than 110 billion euro between the end of 2007 and 2008, for an outstanding amount at

CHART 23 CUSTOMER DEPOSITS IN THE BELGIAN BANKING SECTOR : OUTSTANDING AMOUNTS AND INTEREST RATES APPLIED
(monthly data on an unconsolidated basis)



Sources: CBFA, NBB.

(1) Data from the monthly MIR survey in the case of new deposits.

the end of 2008 of 233 billion euro (incurred expenses included). While netting agreements may substantially reduce the outstanding amount before counterparty risk becomes an issue, it is likely that Belgian banks have faced – especially in the last quarter of 2008, when large market price swings in the underlyings and high levels of volatility boosted the value of derivatives – important margins calls that had to be satisfied by deposits of cash or other forms of (eligible) collateral. The concurrent drain on the pool of available unencumbered collateral reduced the possibilities for secured financing. One possibility to remedy this shortage of eligible collateral has been to securitise assets and keep them on the balance sheet.

The financial crisis has further highlighted the importance of liquidity for the operation of the financial markets and of the banking sector. In response to the crisis and to international consultations among supervisors, the CBFA, like some of its foreign counterparts, has refined and further developed its prudential approach to liquidity risk. In May, a new circular on liquidity risk management was published.

Specifically, the CBFA has introduced stress test observation ratios for the liquidity position of financial institutions. These stress test ratios are intended to reflect the extent to which the liquidity position of the institutions concerned is resistant to the impact of certain exceptional circumstances defined in a stress scenario. These ratios are calculated using the existing periodic liquidity reports that the institutions in question submit to the CBFA. The reports indicate the institutions' cushion of liquid assets as at the reporting date as well as the expected and potential cash flows for the following twelve months. On the basis of these reports, the CBFA calculates the observation ratios, taking into consideration the aforementioned stress scenarios. These ratios will serve as the basis for a robust dialogue between the CBFA and the institutions concerning their liquidity position.

In addition, the new circular also updates the qualitative requirements regarding the management of liquidity risks, based on revised international standards: in September 2008, the Basel Committee published a new set of principles for the liquidity management of credit institutions.

Finally, the circular intensifies the monitoring of liquidity positions by increasing the frequency of existing liquidity reporting and reducing the deadline for the submission of these reports.

2.4.2 Interest rate risk in the banking book

Another manifestation of the risks that banks are exposed to as a result of the mismatches taken between their assets and liabilities is interest rate risk. As an intermediary between depositors and borrowers, banks offer short-term savings products to retail clients on their liability side while extending long-term sources of finance to borrowers on the asset side. The associated interest rate maturity and liquidity mismatches between major categories of assets and liabilities are potential sources of unexpected losses, if the exposures are not managed prudently.

The difference between the contractual and behavioural maturities of the non-maturity deposits, such as sight and savings deposits, is in this regard an important element in the management of the Belgian banks' interest rate risk. It also plays a key role in the calculation of the (positive) duration gap between Belgian banks' assets and liabilities. Yet, banks can mitigate and actively manage their interest rate risk by using a large range of different financial instruments, the most important being derivatives, primarily interest rate swaps and options.

As part of the Pillar II ICAAP process, banks have to report since last year, on a quarterly basis, stress test results related to their exposure to interest rate risk in the banking book. Reported data include the calculated economic value of the banking book at reporting date and under six uniform assumptions imposed by the regulator regarding the size of shifts in the yield curve (immediate parallel shifts in the yield curve, up and down, of 100, 200 and 300 basis points). Although credit institutions have to use their own internal calculation methodologies, comparability of data among institutions is enhanced through the compulsory use of uniform assumptions imposed by the regulator regarding

TABLE 9 IMPACT OF PARALLEL SHIFTS IN THE YIELD CURVE ON THE ECONOMIC VALUE OF THE BANKING BOOK
(percentages of regulatory own funds)

| Size of the parallel shift in the yield curve (basis points) | Impact on the economic value of the banking book (in p.c. of regulatory own funds) |
|--|--|
| +100 | -4 |
| +200 | -8 |
| +300 | -12 |
| -100 | 4 |
| -200 | 8 |
| -300 | 10 |

repricing dates of savings deposits and sight deposits. Based on the data reported for end 2008 on a consolidated basis, the sector's economic value of the banking book would decline by about 4 p.c. of the sector's own funds, under the assumption of an immediate 100 basis points parallel rise of the yield curve (Table 9). For parallel rises in the yield curve of 200 and 300 basis points, the losses amount to 8 and 12 p.c. respectively. These percentages remain below the 20 p.c. warning level that is destined to trigger supervisory action for individual banks as suggested in the Basel II Pillar 2 guidelines regarding the supervisory review process.

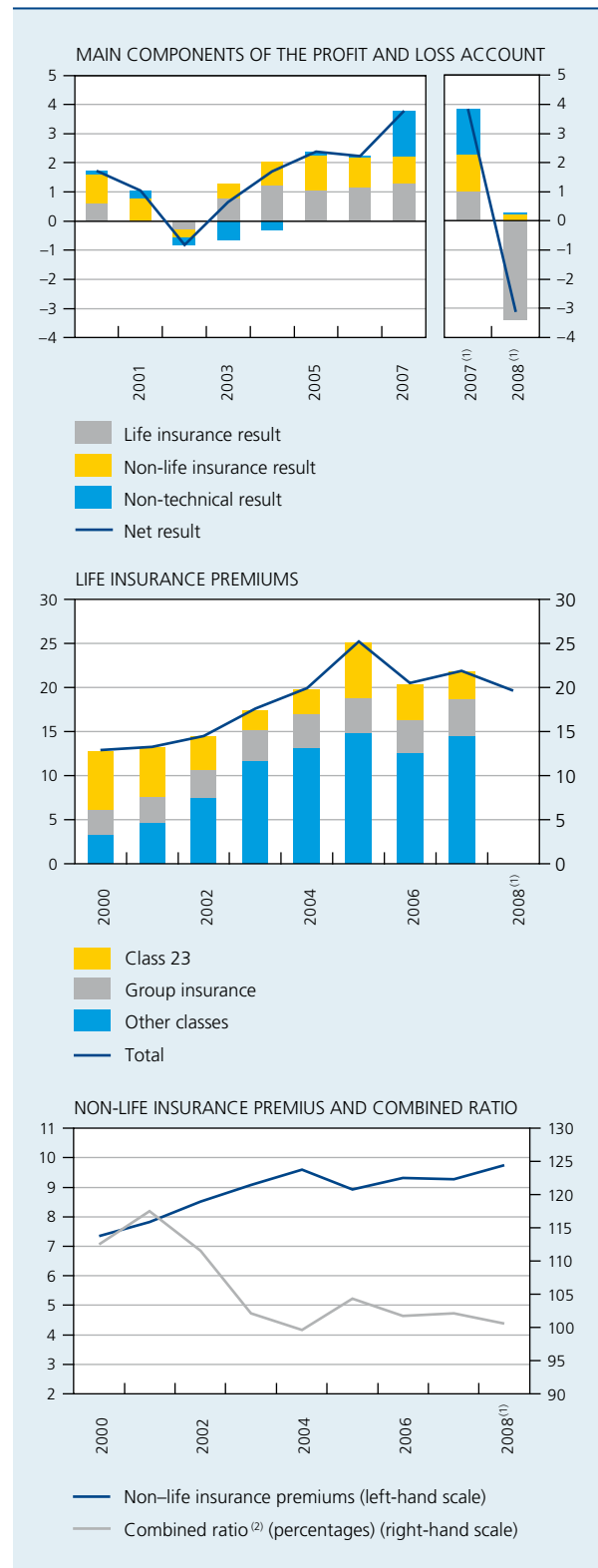
3. Insurance sector

As is evident from the recording of a bottom-line loss of 3.1 billion euro, the crisis on the global financial markets also had a substantial impact on the accounts and the performance of the Belgian insurance sector in 2008. One major insurance company, Ethias, required a government-sponsored recapitalisation, due mainly to losses on its large stake in the Dexia group.

That participation was a legacy of Ethias' origins as an insurance company concentrating on serving local authorities, public enterprises and civil servants. The sharp fall in Dexia's share price in the second half of 2008 magnified the amount of unrealised losses on the portfolio of financial assets held by Ethias, threatening the group's solvency and prompting a request from the CBFA for corrective measures. On 21 October, that request led to the capital injection of 1.5 billion by public authorities, along the lines explained in Box 2 of this Review. The announcement of Ethias' financial problems also led to substantial withdrawals on the trademark product sold by Ethias, namely its "First" life insurance contract with a capital guarantee and profit sharing. Although it was a class 21 insurance policy, the First contract – which had garnered up to 8.7 billion euro for Ethias – had special characteristics which, in particular, offered very great flexibility, with no entry and exit fees. As part of its financial recovery plan, Ethias revised the conditions applicable to new First accounts in order to reduce the group's liquidity risk exposure. The Belgian government supported these efforts by offering insurance companies the opportunity to participate voluntarily in the deposit insurance system, on payment of a premium, in order to cover life insurance products with features similar to bank deposits.

Apart from the developments affecting Ethias, the profitability of other Belgian insurance companies also suffered a sharp fall, in both the life and non-life insurance

CHART 24 NET RESULTS OF THE INSURANCE SECTOR, VOLUME OF ACTIVITY AND LEVEL OF COSTS (unconsolidated data, billion euro, unless otherwise stated)



Sources: CBFA, NBB.
 (1) On the basis of the quarterly supervisory data reports.
 (2) The combined ratio expresses the sum of insurance and operating costs as a ratio of net premium income.

branches, due to sharply lower net gains and losses on financial investments. The technical result in the non-life insurance sector (0.2 billion euro) and the non-technical result (0.1 billion euro) remained slightly positive, but this was dwarfed by the 3.4 billion technical loss in the life insurance branch. This decline in profitability followed a long period of steadily higher profits, culminating in 2007 at 3.8 billion euro (Chart 24). Admittedly, that excellent result was an outlier, as it benefited from exceptional gains on investments in associated companies, which had augmented the investment income included in the non-technical result.

The provisional data for the year 2008 show a significant decline in the level of net premiums collected in life insurance, which dropped by slightly more than 10 p.c. to 19.5 billion euro. While still remaining well above the level seen in the initial years of this decade, this is the lowest level of premiums since 2003. In this regard, it should be remembered that the particularly large amount of premiums collected in 2005 was, however, due to the shifts which occurred between 2005 and 2006 following the introduction on 1 January 2006 of a 1.1 p.c. tax on premiums paid on individual life insurance contracts. Since households had anticipated this tax by paying additional premiums in the final months of 2005, and then reduced their payments in 2006, the net results for 2005 and 2006 were first artificially driven up and then depressed, compared to the picture which would have been expected in the absence of this tax measure.

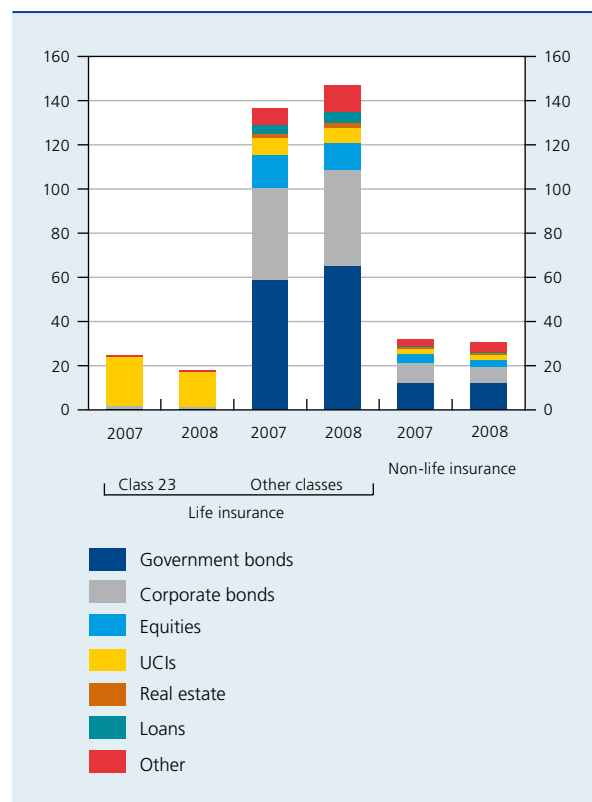
The great majority of life insurance premiums – in both group and individual life insurance – are collected on contracts where the risks relating to financial market developments are borne, at least in part, by the insurer. The proportion of premiums for class 23 contracts, under which the policyholder assumes the financial risks associated with the investments, represented under 20 p.c. of the total during the period 2004-2007. Of the other policies, class 21 life insurance contracts offering a guaranteed minimum return are among the most widespread. Although detailed statistics for the year 2008 are not yet available, other information sources unsurprisingly suggest that class 21 life insurance contracts were by far the main source of new business last year.

Premium performance in non-life insurance was better, with growth of 5.1 p.c. in 2008. The underlying profitability of non-life insurance was also supported by a decline in the combined ratio from 102.1 p.c. in 2007 to 100.6 p.c. This combined ratio is an inverted measure of that underlying profitability, as it expresses insurance and operating costs as a percentage of net premium income. This ratio had exceeded 110 p.c. in 2000-2002,

but declined significantly thereafter as a result of regular adjustments to premiums, better cost control and more rigorous management of the risks covered in insurance branches recording a deficit.

Apart from lower life insurance premiums, the deterioration in the overall profitability of the insurance sector essentially reflected the impact of the international financial crisis, which caused a loss of income and writedowns on insurance companies' investments in financial assets. Substantial writedowns were in fact recognised in 2008, in both the life and non-life branches. In the quarterly financial statements, they were reflected in an increase in investment costs. These costs, which include gross impairments and reductions in the market value of positions in financial assets, increased by 7.4 and 1.4 billion euro respectively in the life and non-life technical results in 2008, as compared to the level recorded in 2007. Many of these impairments and valuation losses concerned insurance companies' equity portfolios and several categories of fixed income instruments, given the stressful market conditions in 2008 and especially during the last quarter of that year.

CHART 25 COMPOSITION OF THE COVERING ASSETS PER INSURANCE BRANCH
(unconsolidated data, billion euro)



Sources: CBFA, NBB.

The size of these investment portfolios, formed to meet future commitments, is proportionately much greater in life insurance than in non-life insurance, having regard to the relative shares of premiums in these two branches of activity, namely around 70 p.c. for life insurance and 30 p.c. for non-life insurance (Chart 25). This is because, in the case of non-life insurance contracts, the production cycle – which usually provides for annual renewal – tends to be shorter than in life insurance, where premiums are generally collected over long periods – in anticipation of a payment in the distant future – requiring the premiums collected to be invested in the meantime.

To limit their exposure to fluctuations in financial asset prices, companies sell life insurance contracts which transfer that risk to the policyholder. Thus, life insurance policies with variable capital, better known as class 23 products, entail no market risk for the companies even though the corresponding assets are recorded on their balance sheet. These products are in fact comparable to mutual investment funds in which the policyholder/investor bears all the investment risks. In terms of outstanding amounts, variable capital contracts represent a mere 9 p.c. of the technical reserves or the assets covering all life insurance policies. A breakdown of the assets covering these class 23 contracts confirms that they are invested mainly in units of collective investment (UCIs).

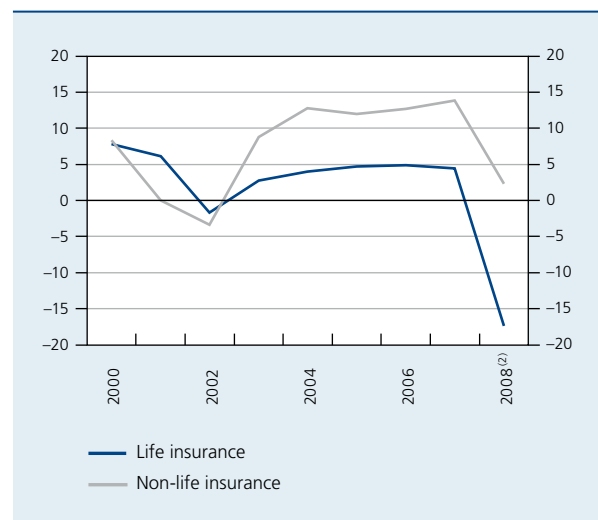
Most of the other life insurance contracts, which mainly comprise class 21 policies, entail some market risk for the insurance companies, owing to the existence of the guaranteed minimum rate of return. That guaranteed rate is generally combined with a profit-sharing mechanism which – though it does not, in principle, imply any market risk for the insurance company – entails a commercial risk.

A second technique which companies use to limit their financial risks in both life and non-life is the diversification of the covering assets. In the case of life insurance policies other than variable capital contracts, these assets consist mainly of government and corporate bonds, which represented 44.3 and 29.6 p.c. respectively of the portfolio at the end of 2008. Equities, including participations in (associated) companies, accounted for 8.1 p.c. of the covering assets (versus 11.0 p.c. at the end of 2007), while loans and real estate investments represented a fairly marginal percentage. The breakdown of the assets covering non-life insurance policies does not seem to be fundamentally different, even though the relative share of equities was a little higher, at 10.1 p.c., offset by lower investments in government and corporate bonds.

The exposure of the Belgian insurance sector to market risk is therefore heavily concentrated on fixed-income instruments, making the sector vulnerable to interest rate fluctuations and – in the case of corporate bonds – to variations in credit and liquidity risk premiums. The securities issued by corporations include structured finance instruments. In that regard, a recent study of a sample of large insurance companies showed that exposure to these instruments is on average lower than 10 p.c. of the total investment portfolio. However, the very tense conditions on international financial markets considerably depressed the prices of these structured products and, more generally, those of all securities with the sole exception of the most secure assets.

The lower dependence on financial investments in the non-life branch compared to the life branch explains why the global market crisis had a smaller impact on the former than on the latter (Chart 26). Though it dropped from 13.8 p.c. in 2007 to 2.3 p.c. in 2008, the net technical result in non-life insurance, expressed as a percentage of premium income, remained above the levels recorded in 2001 and in 2002. Conversely, in life insurance, the deterioration was much more marked, since the net technical result measured on the same basis slumped from 4.4 p.c. in 2007 to –17.4 p.c. in 2008. In 2002, another stressful year, it had dropped to only –1.7 p.c.

CHART 26 COMPARISON OF THE PROFITABILITY OF LIFE AND NON-LIFE INSURANCE ACTIVITIES ⁽¹⁾
(unconsolidated data, percentages of premium income)



Sources: CBFA, NBB.

(1) Net technical result as a percentage of premium income.

(2) On the basis of the quarterly supervisory data reports.

TABLE 10 COMPARISON OF THE MARKET VALUE AND BOOK VALUE OF THE INVESTMENT PORTFOLIO OF BELGIAN INSURANCE COMPANIES

(data at the end of December 2008, billion euro)

| | Book value | Market value | Difference |
|--|--------------|--------------|-------------|
| Real estate | 3.1 | 4.3 | 1.2 |
| Participations in associated companies | 15.2 | 16.0 | 0.8 |
| Equities | 13.3 | 11.5 | -1.8 |
| Bonds | 136.9 | 135.5 | -1.5 |
| Other | 14.9 | 15.4 | 0.4 |
| Total | 183.5 | 182.6 | -0.9 |

Sources: CBFA, NBB.

The recognition of large losses on the holdings of financial instruments in the income statement contributed to a decline in the outstanding amount of unrealised losses on the investment portfolio, down from 4.8 billion euro at the end of September 2008 to 0.9 billion at the end of the year (Table 10). The unrealised losses on financial investments in September 2008 were concentrated on fixed-income securities (5.8 billion) and equities (1.5 billion). The corresponding amounts at the end of 2008 were 1.5 billion and 1.8 billion euro.

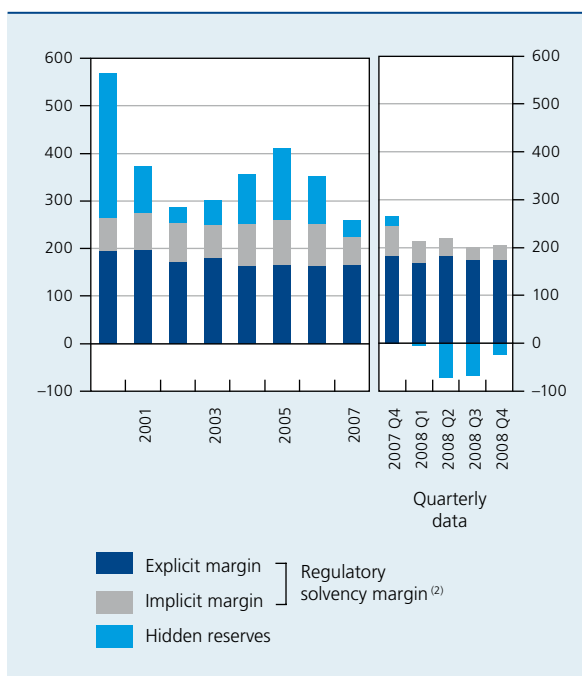
Several insurance companies – including the insurance subsidiaries of KBC and Dexia – strengthened their capital base in 2008. The explicit solvency margin of the insurance sector thus increased by 3.6 billion euro relative to the end of 2007 and helped to maintain solvency ratios close to 200 p.c. of the minimum required margin, notwithstanding the large bottom line loss (Chart 27). In line with the reduced availability of unrealised gains on the investment portfolio, the relative size of the implicit margin – in which, subject to CBFA approval, insurance companies can include some of the unrealised gains on the investment portfolio – declined. The negative amount of the hidden buffer, which comprises the unrealised capital gains or losses which insurance companies have not included in their implicit solvency margin, declined between September 2008 and the end of the year, as insurance companies recorded a significant share of these unrealised losses in the income statement in the last quarter of 2008.

Interest rate changes and fluctuations in bond prices are a crucial parameter in the asset and liability management of insurance companies, especially for the life branch. Exposure to interest rate fluctuations is in fact one of the main risks facing insurance companies in the management of their investments, since the average duration of the sector's financial assets does not match that of the liabilities. The scale and even the direction of this gap differ between the life and non-life segments, as was again confirmed by the stress tests conducted in 2008 by the main companies in the sector, at the request of the NBB and the CBFA (Table 11).

On the one hand, the average duration difference between the investment portfolios and the technical provisions is generally smaller for non-life than for life insurance, so that the former has a lower exposure to interest rate risk. On the other hand, the average duration of the investment portfolios generally exceeds the duration of the corresponding contracts in the case of non-life insurance, while the opposite is true in life insurance.

CHART 27 SOLVENCY MARGIN OF BELGIAN INSURANCE COMPANIES⁽¹⁾

(unconsolidated data, percentages of the minimum required margin)



Sources: CBFA, NBB.

(1) The quarterly supervisory data are not entirely comparable with the final annual figures. In particular, they take no account of any redistribution of profits to shareholders and policyholders.

(2) This margin is composed of an explicit margin – including the own funds, subordinated debts and certain other balance sheet items – and an implicit margin which, subject to the approval of the CBFA, comprises certain other specific elements, the principal one being a part of the unrealised gains on investment portfolios.

TABLE 11 IMPACT OF AN INTEREST RATE SHOCK ON THE NET ASSET VALUE OF BELGIAN INSURANCE COMPANIES ⁽¹⁾
(data as at the end of June 2008, percentage of the available regulatory capital)

| | Life insurance | Non-life insurance | Total |
|----------------------|----------------|--------------------|-------|
| Upward shift | +1.5 | -3.0 | -0.3 |
| Downward shift | -31.9 | +4.3 | -19.5 |

Sources: CBFA, insurance company calculations, NBB.

(1) Impact of a parallel shift in the yield curve of 200 basis points, calculated on the basis of internal models and the assumptions of the main companies.

Moreover, in life insurance there is a relative asymmetry between the negative and positive effects of an upward and downward shift in interest rates. This is due to the characteristics of life insurance contracts with a guaranteed rate of return, under which insurance companies may have to share part of the benefit of higher interest rates with the policyholders, in the form of profit-sharing, while the risk of interest rates falling below the guaranteed minimum is borne entirely by those companies.

The risks associated with the financial investments of insurance companies will be more explicitly taken into account in the Solvency II Directive, which enters into force in 2012. Like the new Basel II rules applicable to banks, this Directive also provides for a three-pillar system. This combines the quantitative rules for calculating the capital requirements, more qualitative requirements concerning risk control – the prudential authorities having

the option of imposing supplementary capital requirements – and finally, obligations regarding the disclosure of information, designed to strengthen market discipline. The quantitative rules under the first pillar take account of a much wider range of risks, and enable companies to use their own risk management models to calculate the capital required. They also incorporate the impact on solvency of fair value accounting in the case of both the financial investments, on the assets side, and the technical provisions, on the liabilities side. This last requirement will correct a serious anomaly in the current model of calculating regulatory capital, namely the absence of any adjustment to the rate for discounting the technical provisions in the event of market interest rate fluctuations.

The economic value has to be calculated with due regard for such factors as the minimum guaranteed rate of return for life insurance policyholders. The level of these guaranteed yields is a particularly significant constraint when interest rates on risk-free products fall to low levels, as was the case in the final quarter of 2008 and the first months of 2009. In fact, such a development could erode the profitability of some guaranteed yield contracts, as happened a few years ago when the returns which insurance companies achieved on their investment portfolio had fallen well below the statutory ceiling on the minimum guaranteed rate of return, namely 4.75 p.c. up to the end of June 1999 and 3.75 p.c. thereafter. Since then, the sector has gradually rectified this adverse structure by marketing new contracts with clauses and guaranteed yields which are more in line with risk-free interest rates and can also be revised if market conditions change. These measures contributed to a reduction in the average guaranteed interest rates on class 21 contracts, which were down from 4.5 p.c. in 1999 to 3.4 p.c. in 2007 and 3.3 p.c. in 2008.

Statistical annex

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TABLE 1 NUMBER OF CREDIT INSTITUTIONS

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|--|------------|------------|------------|------------|------------|------------|------------|------------|
| Credit institutions governed by Belgian law with Belgian majority shareholding | 38 | 36 | 34 | 33 | 26 | 26 | 25 | 23 |
| Credit institutions governed by Belgian law with foreign majority shareholding | 29 | 29 | 27 | 26 | 28 | 25 | 27 | 28 |
| EU Member States | 22 | 21 | 21 | 20 | 23 | 20 | 21 | 21 |
| Other States | 7 | 8 | 6 | 6 | 5 | 5 | 6 | 7 |
| Belgian branches of foreign credit institutions | 46 | 46 | 48 | 45 | 50 | 54 | 58 | 56 |
| EU Member States | 35 | 36 | 38 | 36 | 41 | 46 | 49 | 47 |
| Other States | 11 | 10 | 10 | 9 | 9 | 8 | 9 | 9 |
| Total | 113 | 111 | 109 | 104 | 104 | 105 | 110 | 107 |

Source: CBFA.

TABLE 2 KEY FIGURES
(data on a consolidated basis)

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 ⁽¹⁾ | 2007 ⁽¹⁾ | 2008 ⁽¹⁾ |
|--|-------|---------|---------|---------|---------|---------|---------------------|---------------------|---------------------|
| A. Large banking groups | | | | | | | | | |
| Balance sheet total (billion euro) | 840.6 | 940.7 | 907.5 | 913.2 | 1,010.7 | 1,229.2 | 1,348.0 | 1,488.8 | 1,326.8 |
| Customers' holdings (billion euro) | 440.5 | 477.0 | 465.4 | 453.9 | 482.1 | 532.0 | 667.4 | 700.9 | 612.8 |
| Loans and advances to customers (billion euro) | 352.4 | 374.8 | 381.2 | 384.9 | 433.2 | 535.1 | 553.8 | 619.0 | 505.0 |
| Risk asset ratio (p.c.) | 11.7 | 12.7 | 12.8 | 12.4 | 12.6 | 11.1 | 11.2 | 10.8 | 16.2 |
| Net after tax results (billion euro) | 4.7 | 3.4 | 2.9 | 3.6 | 4.6 | 5.7 | 9.2 | 6.2 | -20.9 |
| Return on average assets (p.c.) | 0.6 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.7 | 0.4 | -1.4 |
| Return on average equity (p.c.) | 22.7 | 15.0 | 12.6 | 14.2 | 17.3 | 19.9 | 23.1 | 13.7 | -40.8 |
| Cost-income ratio (p.c.) | 71.5 | 72.9 | 73.2 | 72.8 | 70.6 | 72.3 | 55.5 | 60.6 | 86.3 |
| B. Total of Belgian credit institutions | | | | | | | | | |
| Balance sheet total (billion euro) | 971.3 | 1,063.7 | 1,024.6 | 1,033.0 | 1,143.2 | 1,369.3 | 1,422.0 | 1,578.4 | 1,422.1 |
| Customers' holdings (billion euro) | 504.2 | 545.0 | 535.3 | 531.9 | 570.1 | 622.1 | 715.7 | 761.6 | 681.8 |
| Loans and advances to customers (billion euro) | 392.7 | 416.3 | 421.3 | 428.8 | 482.9 | 591.3 | 591.0 | 666.2 | 555.6 |
| Risk asset ratio (p.c.) ⁽²⁾ | 11.9 | 12.9 | 13.1 | 12.8 | 13.0 | 11.5 | 11.9 | 11.2 | 16.2 |
| Net after tax results (billion euro) | 5.5 | 3.8 | 3.2 | 4.0 | 5.2 | 6.6 | 9.7 | 6.7 | -20.6 |
| Return on average assets (p.c.) | 0.6 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.7 | 0.4 | -1.3 |
| Return on average equity (p.c.) ⁽²⁾ | 20.4 | 13.7 | 11.8 | 13.6 | 15.8 | 18.5 | 22.4 | 13.2 | -36.5 |
| Cost-income ratio (p.c.) | 72.2 | 74.1 | 74.7 | 73.9 | 72.0 | 72.6 | 55.7 | 61.1 | 86.1 |

Source: CBFA.

(1) Since 2006, the data are based on the new IAS/IFRS prudential reporting scheme. This has led to a methodological break in the time series shown in this table, affecting in particular the level of the cost-income ratio (due to a reclassification of commission expenses), the average yield on assets, the average cost of funding and the interest margin.

(2) Only for credit institutions governed by Belgian law.

TABLE 3 MAIN BALANCE SHEET ITEMS BY ACCOUNTING CATEGORY/PORTFOLIO
(data on a consolidated basis, billion euro)

| | 2007 | 2008 |
|--|----------------|----------------|
| Assets | | |
| Financial assets held for trading | 254.2 | 281.4 |
| Financial assets designated at fair value through profit and loss | 46.7 | 28.4 |
| Available-for-sale financial assets | 215.8 | 214.7 |
| Loans and receivables (including finance leases) | 925.3 | 772.3 |
| Held-to-maturity investments | 14.5 | 13.1 |
| Derivatives used for hedging | 5.6 | 4.4 |
| Tangible assets | 8.1 | 8.4 |
| Goodwill and other intangible assets | 3.9 | 4.7 |
| Investments in associates, subsidiaries and joint ventures | 29.8 | 1.6 |
| Miscellaneous | 74.5 | 93.2 |
| Liabilities | | |
| Financial liabilities held for trading | 193.7 | 240.1 |
| Financial liabilities designated at fair value through profit and loss | 61.5 | 60.9 |
| Financial liabilities measured at amortised cost | 1,183.2 | 955.1 |
| Financial liabilities associated to transferred assets | 21.6 | 7.4 |
| Derivatives used for hedging | 4.1 | 10.1 |
| Provisions | 2.5 | 3.1 |
| Miscellaneous | 44.5 | 96.3 |
| Total equity and minority interest | 67.3 | 49.1 |
| Balance sheet total | 1,578.4 | 1,422.1 |

Source: CBFA.

TABLE 4 **MAIN BALANCE SHEET ITEMS BY PRODUCT**
(data on a consolidated basis, billion euro)

| | 2007 | 2008 |
|--|----------------|----------------|
| Assets | | |
| Loans to credit institutions | 320.8 | 213.2 |
| Loans and advances to other than credit institutions | 666.2 | 555.6 |
| Debt instruments | 296.2 | 298.8 |
| Equity instruments | 52.8 | 15.9 |
| Derivatives ⁽¹⁾ | 120.5 | 223.1 |
| Other assets | 122.0 | 115.6 |
| Liabilities | | |
| Debts to credit institutions | 431.7 | 276.2 |
| Customers' holdings | 761.6 | 681.8 |
| Deposits | 582.4 | 557.4 |
| Bank bonds and other debt securities | 179.1 | 124.4 |
| Derivatives ⁽¹⁾ and short positions | 186.3 | 247.6 |
| Subordinated liabilities | 36.0 | 37.0 |
| Other liabilities | 95.5 | 130.4 |
| Total equity and minority interest | 67.3 | 49.1 |
| Balance sheet total | 1,578.4 | 1,422.1 |

Source: CBFA.

(1) Including accrued income and expenses.

TABLE 5 LOANS AND ADVANCES TO CUSTOMERS⁽¹⁾
 (data on a consolidated basis, billion euro)

| | 2007 | 2008 |
|---|--------------|--------------|
| Term loans | 266.7 | 265.7 |
| Mortgage loans | 208.3 | 132.2 |
| Current accounts | 28.8 | 24.0 |
| Consumer credit | 17.1 | 16.9 |
| Finance leases | 21.4 | 21.7 |
| Bills & own acceptances | 2.9 | 1.7 |
| Securitised loans (for capital and not accounting purposes) | 4.0 | 19.1 |
| Other | 88.2 | 62.7 |
| Total | 637.3 | 544.0 |

Source: CBFA.

(1) Loans included in the accounting portfolio "Loans and receivables" only.

TABLE 6 SECURITIES BY TYPE AND PORTFOLIO
(data on a consolidated basis, billion euro)

| | 2007 | 2008 |
|--|--------------|--------------|
| Total long positions | 378.7 | 316.2 |
| Debt instruments | 296.2 | 298.8 |
| Held for trading | 57.6 | 37.0 |
| Designated at fair value through profit and loss | 15.5 | 15.8 |
| Available-for-sale | 206.9 | 208.5 |
| Loans & receivables | 1.9 | 24.6 |
| Held-to-maturity | 14.2 | 12.8 |
| <i>p.m. Debt instruments involved in repo transactions excluding re-used debt instruments</i> .. | 146.5 | 109.0 |
| Equity instruments | 52.8 | 15.9 |
| Quoted equity | 36.5 | 9.4 |
| Held for trading | 28.9 | 7.3 |
| Designated at fair value through profit and loss | 2.6 | 0.2 |
| Available-for-sale | 4.9 | 1.9 |
| Unquoted equity | 16.3 | 6.5 |
| Held for trading | 12.9 | 4.3 |
| Designated at fair value through profit and loss | 0.9 | 0.8 |
| Available-for-sale | 2.5 | 1.3 |
| <i>p.m. Equity involved in repo transactions excluding re-used equity</i> | 0.2 | 5.6 |
| Investments in associates, subsidiaries and joint ventures (non-consolidated entities) .. | 29.8 | 1.6 |
| Total short positions | 64.1 | 14.9 |
| Debt instruments | 14.1 | 14.3 |
| Equity instruments | 50.0 | 0.6 |

Source : CBFA.

TABLE 7 LIABILITIES TOWARDS CUSTOMERS
 (data on a consolidated basis, billion euro)

| | 2007 | 2008 |
|---|--------------|--------------|
| Retail deposits | 280.9 | 259.1 |
| of which: | | |
| Sight deposits ⁽¹⁾ | 62.1 | 52.8 |
| Savings deposits ⁽¹⁾ | 131.1 | 129.2 |
| Term deposits ⁽¹⁾ | 64.1 | 60.0 |
| Customer savings certificates | 27.2 | 29.9 |
| Deposits of corporates | 257.7 | 256.8 |
| Deposits of non-credit institutions | 32.1 | 34.9 |
| Other customer deposits | 11.8 | 6.6 |
| Certificates of deposits | 81.2 | 37.7 |
| Bonds and other debt certificates | 70.7 | 56.8 |
| Total | 761.6 | 681.8 |

Source: CBFA.

(1) Deposits booked at amortised cost only.

TABLE 8 DERIVATIVES AND OFF-BALANCE-SHEET COMMITMENTS

(data on a consolidated basis, billion euro)

| | Assets and liabilities | |
|---------------------------------------|------------------------|-----------------|
| | 2007 | 2008 |
| Derivatives (notional amounts) | | |
| Held for trading | 8,763.9 | 10,913.0 |
| Interest rate derivatives | 6,749.7 | 9,198.5 |
| Equity derivatives | 340.8 | 214.8 |
| Currency derivatives | 1,265.5 | 1,085.4 |
| Credit derivatives | 365.7 | 311.5 |
| Commodity derivatives | 40.6 | 101.0 |
| Other derivatives | 1.6 | 1.8 |
| Hedging derivatives | 375.1 | 347.9 |
| Micro-hedging | 116.4 | 123.8 |
| Portfolio-hedging | 258.6 | 224.2 |
| Total derivatives | 9,138.9 | 11,261.0 |
| Off-balance-sheet commitments | | |
| Given | | |
| Loan commitments | 451.7 | 315.8 |
| Guarantees | 265.8 | 281.0 |
| Other commitments | 311.2 | 365.3 |
| Received | | |
| Loan commitments | 23.8 | 33.9 |
| Guarantees | 1,107.3 | 581.5 |
| Other commitments | 313.4 | 229.2 |

Source: CBFA.

TABLE 9 OWN FUNDS COMPONENTS OF CREDIT INSTITUTIONS GOVERNED BY BELGIAN LAW

(data on a consolidated basis, billion euro unless otherwise stated)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Own funds sensu stricto ("tier 1 capital") ⁽¹⁾ | 34.2 | 34.3 | 37.9 | 39.2 | 45.9 | 67.5 | 55.7 |
| of which hybrid instruments | 2.7 | 2.4 | 3.1 | 3.6 | 4.9 | 7.8 | 7.8 |
| Additional items of own funds for credit and market risks ("tier 2 capital") | 20.5 | 18.4 | 17.5 | 17.9 | 19.7 | 22.6 | 24.6 |
| of which upper tier 2 ⁽²⁾ | 5.9 | 5.4 | 5.0 | 4.6 | 5.8 | 6.0 | 9.3 |
| of which lower tier 2 ⁽³⁾ | 14.6 | 12.9 | 12.5 | 13.3 | 13.9 | 16.6 | 16.6 |
| Deduction of participations | -3.7 | -3.9 | -4.2 | -4.8 | -3.3 | -26.6 | -1.0 |
| Total | 50.9 | 48.8 | 57.2 | 52.3 | 62.3 | 63.6 | 79.5 |
| Additional items of own funds for market risks only ("tier 3 capital") ⁽⁴⁾ | 1.9 | 2.1 | 2.1 | 1.3 | 0.1 | 0.0 | 0.1 |
| Risk asset ratio (p.c.) | 13.1 | 12.8 | 13.0 | 11.5 | 11.9 | 11.2 | 16.2 |

Source: CBFA.

(1) Includes i.a. paid-up capital, reserves, the fund for general banking risks and third-party interests. Positive consolidation differences have to be deducted.

(2) Includes the revaluation reserves, the internal security fund, the perpetuals and other instruments with a subordinated nature and for which the principal or interest payments may be suspended in case of losses.

(3) Includes long-term subordinated debts (minimum initial maturity of 5 years).

(4) Includes the trading portfolio's net result and short-term subordinated debts, after application of the regulatory limitations.

TABLE 10 INCOME AND EXPENSES
(data on a consolidated basis, billion euro)

| | 2007 | 2008 |
|---|------------|--------------|
| Interest income | 202.2 | 233.0 |
| Interest expenses (-) | 188.9 | 218.5 |
| Net interest income | 13.3 | 14.5 |
| Dividend income | 0.3 | 0.4 |
| Net fee income | 7.3 | 6.8 |
| <i>Fees received</i> | 10.2 | 9.5 |
| <i>Fees paid</i> (excluding the commissions paid to bank agents) (-) | 2.8 | 2.7 |
| Realised capital gains or losses (on financial assets and liabilities other than measured at fair value through profit and loss) | 1.2 | -0.3 |
| Trading income (gains or losses on financial assets held for trading) | 2.1 | -6.6 |
| Other fair value accounting gains and losses | 0.5 | 3.0 |
| <i>Gains and losses on financial assets and liabilities designated at fair value through profit and loss</i> | 0.2 | 2.4 |
| <i>Fair value adjustments in hedge accounting</i> | 0.2 | 0.6 |
| Other net operating income | 1.6 | 1.5 |
| Non-interest income | 13.0 | 4.8 |
| Gross operating income (banking product) | 26.3 | 19.3 |
| Staff expenses (-) | 8.5 | 8.6 |
| Commissions paid to bank agents (-) | 0.6 | 0.6 |
| General and administrative expenses (-) | 6.1 | 6.4 |
| Depreciation (-) | 0.9 | 1.0 |
| Operating expenses (excluding impairment losses and provisions) (-) | 16.1 | 16.6 |
| Impairment losses on financial assets (-) | 2.9 | 10.3 |
| Impairment on property, investment properties, intangible assets, investments and associates and joint ventures accounted for using the equity method (-) | 0.0 | 2.3 |
| Provisions (-) | 0.3 | 0.7 |
| Impairment losses and provisions (-) | 3.2 | 13.3 |
| Share of the profit or loss of associates, and joint ventures accounted for using the equity method | 0.6 | -0.1 |
| Negative goodwill immediately recognised in profit and loss | 0.0 | 0.0 |
| Total profit or loss from non-current assets and disposal groups classified as held for sale not qualifying as discontinued operations | 0.0 | -0.7 |
| Net operating income | 7.8 | -11.4 |
| Total profit or loss after tax from discontinued operations | 0.0 | -9.0 |
| Total profit or loss before tax and minority interest | 7.7 | -20.5 |
| Tax expenses related to profit or loss from continuing operations (-) | 0.8 | 0.5 |
| Total profit or loss after tax and before minority interest | 6.9 | -21.0 |
| Minority interest (-) | 0.3 | 0.3 |
| Net profit or loss | 6.7 | -21.2 |

Source: CBFA.

TABLE 11 NUMBER OF INSURANCE COMPANIES

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|--|------------|------------|------------|------------|------------|------------|------------|
| A. By the location of their registered office | | | | | | | |
| Belgium ⁽¹⁾ | 123 | 118 | 118 | 110 | 107 | 106 | 100 |
| European Economic Area ⁽²⁾ | 73 | 66 | 60 | 58 | 54 | 50 | 51 |
| Rest of the world ⁽³⁾ | 6 | 5 | 3 | 3 | 0 | 0 | 0 |
| Total | 202 | 189 | 181 | 171 | 161 | 156 | 151 |
| Free service provision ⁽⁴⁾ | 629 | 670 | 681 | 740 | 762 | 791 | 873 |
| B. By specialisation⁽⁵⁾ | | | | | | | |
| Life insurance | 30 | 31 | 31 | 30 | 29 | 30 | 30 |
| Non-life insurance | 140 | 127 | 122 | 116 | 109 | 103 | 99 |
| Life and non-life insurance | 32 | 31 | 28 | 25 | 23 | 23 | 22 |
| Total | 202 | 189 | 181 | 171 | 161 | 156 | 151 |

Source: CBFA.

(1) Companies with their registered office in Belgium comprise the Belgian subsidiaries of foreign companies.

(2) Belgian branches of companies with their registered office in another E.E.A. country.

(3) Belgian branches of companies with their registered office outside the E.E.A.

(4) Provision of insurance services without an establishment in Belgium.

(5) Including the Belgian branches of foreign insurance companies.

TABLE 12 MAIN COMPONENTS OF INSURANCE COMPANIES' ASSETS⁽¹⁾
(data on a company basis, billion euro)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|--------------|--------------|--------------|--------------|--------------|--------------|
| Investments | 110.3 | 125.2 | 143.3 | 166.5 | 183.7 | 201.7 |
| All activities with the exception of class 23 | 94.6 | 107.9 | 124.4 | 141.7 | 158.3 | 177.2 |
| Shares ⁽²⁾ | 15.8 | 13.8 | 15.1 | 17.9 | 18.8 | 19.7 |
| Debt securities | 58.9 | 72.2 | 88.2 | 101.2 | 115.2 | 130.0 |
| Land and buildings | 2.4 | 2.4 | 2.6 | 2.6 | 2.5 | 2.6 |
| Mortgage loans | 5.9 | 5.7 | 5.7 | 5.5 | 5.5 | 5.4 |
| Investments in affiliated undertakings | 7.4 | 8.0 | 8.2 | 9.2 | 11.0 | 14.2 |
| Others | 4.2 | 5.8 | 4.6 | 5.3 | 5.2 | 5.3 |
| Class 23 | 15.8 | 17.3 | 18.9 | 24.8 | 25.5 | 24.6 |
| Shares ⁽²⁾ | 13.1 | 13.4 | 13.7 | 19.5 | 21.2 | 19.5 |
| Debt securities | 2.1 | 2.6 | 3.2 | 4.1 | 3.8 | 4.6 |
| Others | 0.6 | 1.3 | 2.0 | 1.3 | 0.4 | 0.5 |
| Reinsured part of technical provisions | 6.0 | 6.2 | 6.6 | 5.2 | 4.9 | 4.8 |
| Claims and other assets | 9.8 | 11.0 | 13.8 | 13.3 | 13.2 | 13.8 |
| Total | 126.1 | 142.4 | 163.7 | 185.0 | 201.9 | 220.4 |

Source: CBFA.

(1) Insurance companies supervised by the CBFA.

(2) Including shares in UCITS.

TABLE 13 MAIN COMPONENTS OF INSURANCE COMPANIES' LIABILITIES ⁽¹⁾
(data on a company basis, billion euro)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|--------------|--------------|--------------|--------------|--------------|--------------|
| Own funds | 7.9 | 8.8 | 9.4 | 10.2 | 10.7 | 11.9 |
| Technical provisions | 106.9 | 120.8 | 137.8 | 156.5 | 169.9 | 185.5 |
| Life insurance (with the exception of class 23) | 63.8 | 76.2 | 88.9 | 103.7 | 115.2 | 130.6 |
| Class 23 | 16.0 | 17.5 | 19.2 | 25.0 | 25.7 | 24.7 |
| Non-life insurance | 22.4 | 23.1 | 24.2 | 22.7 | 23.3 | 24.0 |
| Others | 4.6 | 5.0 | 5.5 | 5.1 | 5.7 | 6.2 |
| Reinsurance companies' deposits | 2.3 | 2.4 | 2.5 | 2.7 | 2.6 | 2.7 |
| Creditors' claims | 6.9 | 8.2 | 11.8 | 13.5 | 16.5 | 17.6 |
| Other liabilities | 2.1 | 2.2 | 2.2 | 2.0 | 2.2 | 2.6 |
| Total | 126.1 | 142.4 | 163.7 | 185.0 | 201.9 | 220.4 |

Source: CBFA.

(1) Insurance companies supervised by the CBFA.

TABLE 14 COMPONENTS OF THE INCOME STATEMENT OF INSURANCE COMPANIES ⁽¹⁾
(data on a company basis, billion euro unless otherwise stated)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|--|--------------|-------------|-------------|-------------|-------------|-------------|
| A. Technical account in life insurance | | | | | | |
| Net premiums written | 14.4 | 17.7 | 20.0 | 25.2 | 20.4 | 21.9 |
| Claims paid (-) | 6.9 | 7.9 | 8.5 | 10.2 | 13.0 | 13.0 |
| Change in the provisions for claims (-) | 6.4 | 12.9 | 15.2 | 20.5 | 12.4 | 13.3 |
| Premiums after insurance costs | 1.2 | -3.1 | -3.7 | -5.4 | -5.0 | -4.4 |
| Net operating expenses (-) | 1.1 | 1.2 | 1.2 | 1.3 | 1.4 | 1.6 |
| Result before investment income | 0.0 | -4.3 | -4.9 | -6.8 | -6.4 | -6.0 |
| Net investment income | -0.3 | 4.8 | 5.7 | 8.0 | 7.4 | 6.9 |
| Technical result life insurance | -0.2 | 0.5 | 0.8 | 1.2 | 1.0 | 1.0 |
| B. Technical account in non-life insurance | | | | | | |
| Net premiums written | 8.5 | 9.1 | 9.6 | 8.9 | 9.3 | 9.3 |
| Claims paid (-) | 5.9 | 5.7 | 5.7 | 5.6 | 5.9 | 6.3 |
| Change in the provisions for claims (-) | 0.9 | 0.8 | 1.0 | 1.1 | 0.8 | 0.5 |
| Premiums after insurance costs | 1.7 | 2.6 | 2.9 | 2.3 | 2.6 | 2.5 |
| Net operating expenses (-) | 2.7 | 2.8 | 2.9 | 2.7 | 2.8 | 2.7 |
| Result before investment income | -1.0 | -0.2 | 0.0 | -0.4 | -0.2 | -0.2 |
| Net investment income | 0.7 | 1.0 | 1.2 | 1.5 | 1.3 | 1.5 |
| Technical result non-life insurance | -0.3 | 0.8 | 1.2 | 1.1 | 1.2 | 1.3 |
| C. Non-technical account | | | | | | |
| Total technical result life and non-life insurance | -0.5 | 1.3 | 2.0 | 2.3 | 2.2 | 2.2 |
| Residual net investment income | 0.1 | -0.2 | 0.3 | 0.7 | 0.5 | 1.7 |
| Other and exceptional results and taxes | -0.4 | -0.4 | -0.6 | -0.6 | -0.5 | -0.1 |
| Net result | -0.8 | 0.6 | 1.7 | 2.4 | 2.2 | 3.8 |
| <i>p.m. Return on equity (p.c.)</i> | <i>-10.4</i> | <i>7.3</i> | <i>18.0</i> | <i>23.3</i> | <i>20.8</i> | <i>31.7</i> |

Source: CBFA.

(1) Insurance companies supervised by the CBFA.

TABLE 15 LEVEL AND COMPOSITION OF INSURANCE COMPANIES' AVAILABLE SOLVENCY MARGIN⁽¹⁾
(data on a company basis, million euro unless otherwise stated)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---------------|---------------|---------------|---------------|---------------|---------------|
| Explicit margin | 8,238 | 9,467 | 10,706 | 11,726 | 12,767 | 14,199 |
| <i>Percentages of required margin</i> | 173 | 179 | 181 | 180 | 179 | 183 |
| Implicit margin | 3,853 | 3,634 | 4,092 | 5,148 | 5,279 | 3,144 |
| Future profits of life insurance activities | 1,855 | 1,874 | 755 | 749 | 655 | 484 |
| Unrealised capital gains | 1,998 | 1,761 | 3,337 | 4,399 | 4,624 | 2,660 |
| <i>Percentages of required margin</i> | 81 | 69 | 70 | 79 | 74 | 40 |
| Total margin | 12,091 | 13,101 | 14,799 | 16,874 | 18,046 | 17,344 |
| <i>Percentages of required margin</i> | 254 | 248 | 251 | 259 | 253 | 223 |

Source: CBFA.

(1) Insurance companies supervised by the CBFA.

TABLE 16 COMPOSITION OF INSURANCE COMPANIES' COVERING ASSETS FOR ALL TYPES OF ACTIVITIES⁽¹⁾⁽²⁾

(data on a company basis, percentages of total covering assets unless otherwise stated)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|-----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Bonds | 50.0 | 52.7 | 55.8 | 57.4 | 59.5 | 64.1 | 66.2 |
| Equities | 14.6 | 12.9 | 12.7 | 13.9 | 14.1 | 10.1 | 7.7 |
| Real estate | 3.1 | 2.8 | 2.4 | 2.2 | 2.1 | 1.4 | 1.6 |
| Loans | 5.6 | 4.7 | 3.6 | 2.7 | 2.3 | 2.3 | 2.8 |
| UCITS | 15.6 | 15.6 | 15.1 | 16.2 | 16.5 | 16.1 | 12.5 |
| Others | 11.1 | 11.3 | 10.3 | 7.6 | 5.5 | 5.9 | 9.2 |
| Total (billion euro) | 110.5 | 127.6 | 147.3 | 168.8 | 182.7 | 193.1 | 196.5 |

Source: CBFA.

(1) Assets allocated to a specific insurance activity as a cover for the liabilities resulting from that activity. Covering assets are valued at "affection value", which corresponds to the market value for most assets, but is related to the historical cost for bonds emitted by government bodies.

(2) Insurance companies supervised by the CBFA.

TABLE 17 KEY FIGURES OF STOCKBROKING FIRMS
 (data on a company basis)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|-------|-------|------|------|------|------|------|
| Number of companies | 40 | 37 | 36 | 31 | 27 | 26 | 23 |
| Securities portfolio for own account (billion euro) ⁽¹⁾⁽²⁾ | 12.00 | 18.60 | 1.89 | 0.25 | 0.14 | 0.23 | 0.39 |
| Balance sheet total (billion euro) ⁽²⁾ | 9.88 | 15.48 | 3.11 | 2.37 | 2.30 | 3.06 | 2.70 |
| Securities in trust (billion euro) | 19.7 | 32.8 | 28.4 | 41.1 | 46.6 | 73.2 | 54.8 |
| Regulatory own funds (billion euro) | 0.33 | 0.23 | 0.26 | 0.29 | 0.22 | 0.43 | 0.61 |
| Risk asset ratio (p.c.) | 17.7 | 16.2 | 36.0 | 58.2 | 46.5 | 35.9 | 39.1 |
| Income (billion euro) ⁽²⁾ | 0.34 | 0.31 | 0.19 | 0.27 | 0.32 | 0.36 | 0.28 |
| Operating expenses (billion euro) ⁽²⁾ | 0.35 | 0.32 | 0.18 | 0.18 | 0.21 | 0.25 | 0.28 |
| Net after tax results (billion euro) ⁽²⁾ | 0.00 | 0.02 | 0.05 | 0.10 | 0.13 | 0.17 | 0.06 |
| Return on average equity (p.c.) ⁽³⁾ | 0.6 | 2.7 | 11.9 | 28.0 | 36.5 | 37.8 | 8.0 |

Source: CBFA.

(1) The securities portfolio consists of the long positions (financial instruments held by stockbroking firms for their own account, with the exclusion of participations) and the short positions (uncovered sales of financial instruments).

(2) Figures from the quarterly financial statements in which positions are marked to market.

(3) Ratio of the net result after taxes to the accounting own funds. The latter have been established on the basis of the quarterly financial statements and are composed of the capital, share premiums, capital gains, reserves, results brought forward, and subordinated debt.

TABLE 18 KEY FIGURES OF PORTFOLIO MANAGEMENT AND INVESTMENT ADVICE COMPANIES
(data on a company basis)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|--|-------|-------|-------|------|------|------|------|
| Number of companies | 33 | 30 | 30 | 23 | 22 | 23 | 26 |
| of which with a majority of institutional shareholders | 16 | 15 | 14 | 8 | 8 | 8 | 10 |
| Assets under management (billion euro) | 135.6 | 183.3 | 191.7 | 32.4 | 46.7 | 49.1 | 24.5 |
| Balance sheet total (billion euro) | 0.77 | 1.08 | 1.21 | 0.08 | 0.10 | 0.09 | 0.08 |
| Own funds (billion euro) | 0.43 | 0.65 | 0.70 | 0.05 | 0.05 | 0.05 | 0.06 |
| Income (billion euro) | 0.58 | 0.77 | 0.88 | 0.07 | 0.08 | 0.10 | 0.05 |
| Operating expenses (billion euro) | 0.27 | 0.48 | 0.54 | 0.04 | 0.05 | 0.06 | 0.05 |
| Net after tax results (billion euro) | 0.22 | 0.21 | 0.26 | 0.02 | 0.03 | 0.03 | 0.00 |
| Return on average equity (p.c.) | 50.2 | 32.9 | 37.8 | 39.0 | 54.1 | 62.5 | 3.4 |

Source: CBFA.

TABLE 19 KEY FIGURES OF MANAGEMENT COMPANIES OF UNDERTAKINGS FOR COLLECTIVE INVESTMENT
(data on a company basis)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|--|------|------|------|-------|-------|-------|-------|
| Number of companies | - | - | - | 5 | 6 | 7 | 7 |
| Assets under management (billion euro) | - | - | - | 211.4 | 256.4 | 251.9 | 192.5 |
| Balance sheet total (billion euro) | - | - | - | 1.4 | 0.9 | 1.0 | 1.0 |
| Own funds (billion euro) | - | - | - | 0.7 | 0.3 | 0.3 | 0.2 |
| Income (billion euro) | - | - | - | 0.9 | 1.2 | 1.5 | 1.3 |
| Operating expenses (billion euro) | - | - | - | 0.6 | 0.9 | 1.1 | 1.1 |
| Net after tax results (billion euro) | - | - | - | 0.3 | 0.3 | 0.3 | 0.3 |
| Return on average equity (p.c.) | - | - | - | 40.6 | 87.9 | 78.3 | 149.6 |

Source: CBFA.

TABLE 20 BELGIAN UNDERTAKINGS FOR COLLECTIVE INVESTMENT

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|--------------|----------------------|--------------|---------------|---------------|---------------|--------------|
| A. Number per legal form (end of period) | | | | | | | |
| Investment companies | 108 | 105 | 108 | 108 | 108 | 105 | 98 |
| Number of compartments | 1,987 | 1,252 ⁽⁵⁾ | 1,365 | 1,477 | 1,649 | 1,842 | 1,900 |
| Investment funds | 16 | 16 | 18 | 17 | 40 | 37 | 37 |
| Pension-savings funds ⁽¹⁾ | 10 | 11 | 12 | 12 | 14 | 14 | 14 |
| Real estate UCITS ⁽²⁾ | 11 | 11 | 11 | 12 | 14 | 14 | 14 |
| Undertakings for investment in receivables ⁽³⁾ | 10 | 10 | 9 | 7 | 7 | 6 | 5 |
| Venture capital UCITS ⁽⁴⁾ | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Total | 157 | 155 | 160 | 158 | 185 | 179 | 171 |
| B. Assets (billion euro) | | | | | | | |
| 1. Net asset value end of preceding year | 88.32 | 78.26 | 85.05 | 95.34 | 112.14 | 124.27 | 121.22 |
| 2. Subscriptions | 18.31 | 20.32 | 23.15 | 37.60 | 39.99 | 55.51 | 38.87 |
| 3. Redemptions | 14.87 | 16.86 | 17.58 | 22.26 | 29.58 | 48.54 | 46.91 |
| 4. Net amounts invested (4 = 2 - 3) | 3.44 | 3.47 | 5.57 | 15.34 | 10.41 | 6.97 | -8.05 |
| 5. Costs | 0.99 | 0.99 | 1.14 | 1.18 | 1.41 | 1.39 | 1.24 |
| 6. Capital gains or losses | -12.51 | 4.31 | 5.86 | 2.64 | 3.12 | -8.63 | -24.33 |
| 7. Net asset value end of period (7 = 1 + 4 - 5 + 6) | 78.26 | 85.05 | 95.34 | 112.14 | 124.27 | 121.22 | 87.61 |

Source: CBFA.

(1) Pension-savings funds, authorised by application of the Royal Decree of 22 December 1986.

(2) Investment companies investing in real estate, authorised by application of the Royal Decree of 10 April 1995.

(3) Undertakings for investment in receivables, authorised by application of the Royal Decree of 29 November 1993.

(4) Investment companies investing in unlisted companies and in growth companies, authorised by application of the Royal Decree of 18 April 1997.

(5) Since 2003, this series no longer covers the legally existing, but not commercialised compartments. This explains the sharp drop between 2002 and 2003.

TABLE 21 NUMBER OF FOREIGN UNDERTAKINGS FOR COLLECTIVE INVESTMENT DISTRIBUTED IN BELGIUM
(end of period)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|------------|------------|------------|------------|------------|------------|------------|
| Per legal form | | | | | | | |
| Investment companies | 194 | 197 | 184 | 170 | 173 | 171 | 191 |
| Number of compartments | 2,036 | 2,067 | 2,030 | 2,122 | 2,172 | 2,366 | 2,632 |
| Investment funds | 70 | 70 | 61 | 46 | 53 | 60 | 70 |
| Total | 264 | 267 | 245 | 216 | 226 | 231 | 261 |
| Per category | | | | | | | |
| Undertakings with UCITS-passport | 230 | 218 | 206 | 198 | 209 | 216 | 250 |
| Number of compartments | 1,891 | 1,925 | 1,918 | 2,023 | 2,068 | 2,258 | 2,530 |
| Undertakings without UCITS-passport | 34 | 49 | 39 | 18 | 17 | 15 | 11 |
| Number of compartments | 145 | 142 | 112 | 99 | 104 | 108 | 102 |
| Total | 264 | 267 | 245 | 216 | 226 | 231 | 261 |

Source: CBFA.

TABLE 22 BREAKDOWN OF UNDERTAKINGS FOR COLLECTIVE INVESTMENT DISTRIBUTED IN BELGIUM ACCORDING TO INVESTMENT STRATEGY
(billion euro)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|-------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Bond funds | 31.22 | 31.73 | 35.33 | 52.92 | 56.18 | 45.85 | 29.42 |
| Medium-term funds | 1.75 | 1.89 | 1.83 | 1.47 | 0.95 | 0.78 | 0.59 |
| Money market funds | 6.29 | 5.71 | 6.16 | 5.92 | 5.30 | 7.01 | 7.83 |
| Equity funds | 24.71 | 26.72 | 27.86 | 39.71 | 43.40 | 42.42 | 18.60 |
| Funds with capital protection | 31.77 | 35.90 | 41.40 | 41.70 | 42.62 | 42.01 | 36.15 |
| Balanced funds | 21.95 | 22.85 | 23.42 | 25.57 | 29.85 | 31.98 | 21.49 |
| Pension-savings funds | 6.40 | 7.42 | 8.69 | 10.32 | 11.44 | 11.78 | 8.98 |
| Real estate funds | 3.39 | 3.85 | 4.42 | 5.59 | 7.27 | 6.12 | 4.67 |
| Private equity funds | 0.07 | 0.08 | 0.09 | 0.14 | 0.15 | 0.12 | 0.05 |
| Miscellaneous | 0.02 | 0.02 | 0.10 | 0.47 | 0.80 | 0.34 | 0.16 |
| Total | 127.57 | 136.17 | 149.28 | 183.81 | 197.96 | 188.42 | 127.95 |

Source: BEAMA.

TABLE 23 GROSS PUBLIC ISSUES OF SECURITIES IN BELGIUM
(billion euro)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|-------------|-------------|-------------|-------------|-------------|--------------|--------------|
| 1. Shares | | | | | | | |
| Belgian companies | 0.35 | 0.35 | 3.56 | 1.83 | 1.33 | 17.69 | 6.51 |
| Foreign companies | 0.12 | 0.03 | 0.09 | 0.02 | 0.00 | 0.00 | 0.00 |
| <i>Total</i> | <i>0.47</i> | <i>0.38</i> | <i>3.65</i> | <i>1.84</i> | <i>1.33</i> | <i>17.69</i> | <i>6.51</i> |
| 2. Fixed income securities | | | | | | | |
| 2.1 Bonds | <i>0.38</i> | <i>1.23</i> | <i>5.52</i> | <i>4.97</i> | <i>5.54</i> | <i>5.29</i> | <i>12.28</i> |
| Belgian companies | 0.01 | 0.05 | 0.23 | 0.38 | 0.24 | 0.21 | 3.10 |
| Foreign companies | 0.37 | 1.18 | 5.29 | 4.59 | 5.31 | 5.08 | 9.18 |
| 2.2 Fixed income securities with capital at risk⁽¹⁾ | <i>1.50</i> | <i>0.34</i> | <i>0.27</i> | <i>0.55</i> | <i>1.11</i> | <i>0.77</i> | <i>0.65</i> |
| Belgian companies | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 |
| Foreign companies | 1.50 | 0.34 | 0.27 | 0.55 | 1.09 | 0.77 | 0.65 |
| 2.3 Total | <i>1.88</i> | <i>1.57</i> | <i>5.78</i> | <i>5.52</i> | <i>6.65</i> | <i>6.06</i> | <i>12.93</i> |
| 3. Subordinated debt issued by credit institutions | 0.05 | 0.66 | 0.96 | 1.05 | 1.44 | 1.54 | 0.48 |
| 4. Government debt | | | | | | | |
| 4.1 Linear bonds (OLOs) | <i>26.1</i> | <i>23.3</i> | <i>22.4</i> | <i>23.3</i> | <i>23.7</i> | <i>25.6</i> | <i>0.7</i> |
| 4.2 Other bonds and notes | <i>1.3</i> | <i>1.3</i> | <i>0.9</i> | <i>0.6</i> | <i>0.7</i> | <i>0.5</i> | <i>0.7</i> |
| 4.3 Treasury certificates⁽²⁾ | <i>0.1</i> | <i>-0.8</i> | <i>-0.1</i> | <i>0.8</i> | <i>0.1</i> | <i>3.4</i> | <i>0.7</i> |

Sources: Belgian Debt Agency, CBFA, NBB.

(1) Mainly reverse convertible bonds, being interest-bearing financial securities that give the choice, at maturity, of returning the invested capital by making a payment in cash (at face value) or by transferring the corporate security (or a number of corporate securities) specified in the contract. The investment yield of these financial securities is the premium for the put option that the investor writes on a corporate security.

(2) Net issues.

Resilience of financial infrastructure

Overview of the NBB's oversight activities for 2008

Introduction

The central bank's oversight of the payment and settlement infrastructure is motivated by the ultimate policy objective of promoting safety and efficiency of the payment infrastructure as a whole. Consequently, oversight activity encompasses all components of the payment infrastructure which are relevant for its safety and efficiency.

These components can vary quite considerably in the type of activity they perform. A first typical class of components of the financial infrastructure to be overseen by central banks would be the infrastructures that underpin financial markets, such as large-value payment systems, securities settlement systems and central counterparties. A sound and efficient functioning of such systems is a prerequisite for minimising and containing systemic risk, as otherwise it would be through these infrastructures that the domino effect – if a bank were to fail – could be likely to occur.

A second class of components of the financial infrastructure would be composed of retail systems, such as retail payment systems, automated clearing houses and card schemes. Their oversight is not motivated by systemic risk concerns, but rather by a concern of promoting/maintaining the public's confidence in the payment systems and instruments, and ultimately, in the currency.

A third class of components consists of service providers, on which the systems in the first two component groups rely. Although such service providers do not actually qualify as payment systems or as securities settlement systems *per se*, their smooth and secure operation is of such crucial importance for the sound and efficient functioning of payment and securities settlement systems that

central banks have extended their oversight activity to cover them. Typical examples are message providers such as SWIFT, or operators of card payment schemes.

The NBB's oversight covers systems from all three components, so that it oversees a wide variety of infrastructures, ranging from large-value payment systems, securities settlement systems (SSS) and central counterparties (CCP) to retail payment systems, card schemes and e-money schemes, via message providers and payment card operators (see table 1).

Many of these infrastructures have an international dimension, some of them limited to the euro area, others worldwide. As laid down in the so-called Lamfalussy

TABLE 1 THE NBB'S OVERSIGHT UNIVERSE

| | |
|--|---|
| <p>Large-value systems <i>Systemic Importance</i></p> <p>Payment systems CLS TARGET2</p> <p>Securities settlement system Euroclear Bank – ICSD Euroclear Belgium Euroclear SA NBB-SSS</p> <p>CCP Clearnet SA</p> | <p>Retail systems <i>Public confidence</i></p> <p>Payment systems CEC</p> <p>Card schemes Bancontact MisterCash (BC/MC) MasterCard Europe</p> <p>E-Money schemes Proton</p> |
| <p>Service Providers SWIFT – message provider</p> <p style="text-align: right;">Atos Worldline (operator of BC/MC)</p> | |

TABLE 2 THE NBB'S OVERSIGHT ARRANGEMENTS

| | International cooperative oversight | | NBB overseer | NBB sole overseer | Cooperation with CBFA |
|--------------------------------------|-------------------------------------|------------------------------------|---------------------------|-------------------|-----------------------|
| | NBB lead overseer | NBB participates in an arrangement | Peer review in Eurosystem | | |
| Large-value payment systems | | | | | |
| CLS | | X | | | |
| TARGET2 | | X | | | |
| Securities settlement systems | | | | | |
| Euroclear Bank – ICSD | | | | X | X |
| Euroclear Belgium ⁽¹⁾ | | | | X | X |
| Euroclear SA | X | | | | X |
| NBB-SSS | | | | X | |
| CCP | | | | | |
| Clearnet | | X | | | X |
| Card schemes | | | | | |
| Bancontact MisterCash | | | X | | |
| MasterCard Europe | | | X | | |
| Retail payment systems | | | | | |
| CEC | | | X | | |
| Service Providers | | | | | |
| SWIFT | X | | | | |
| Atos Wordline | | | X | | |

(1) International cooperative oversight also exists for ESES CSDs (see point 1.3).

principles for cooperative oversight, the NBB performs the role of lead overseer for international infrastructures that are established in Belgium (such as SWIFT, Euroclear); for international infrastructures established outside Belgium, but delivering services to Belgium, the NBB participates in the cooperative oversight, under the leadership of the relevant central bank. As can be seen from table 2, the NBB is involved in a number of cooperative oversight arrangements.

As many of the lessons learned from the financial crisis have shown, sound and smooth international cooperation is of paramount importance for effective surveillance of the financial system. The cooperative arrangements in which the NBB is involved, be it as lead overseer, or as cooperating central bank, have proven to be effective instruments for overseeing infrastructures which have an international dimension, and these arrangements have performed well in crisis situations.

The remainder of this article briefly reviews the oversight activities for which the NBB acts as sole or lead overseer.

1. Oversight of securities settlement systems

The oversight responsibilities relating to securities settlement systems encompass four operators delivering their settlement services in Belgium, namely the Euroclear companies (Euroclear SA, Euroclear Bank and Euroclear Belgium) and the NBB itself.

User-owned and user-governed, the Euroclear group comprises the international central securities depository (ICSD) Euroclear Bank, which is based in Belgium, as well as national CSDs Euroclear Belgium, Euroclear France, Euroclear Nederland, and Euroclear UK & Ireland. The Finnish and Swedish CSDs (renamed Euroclear Sweden and Euroclear Finland) became part of the group at the end of 2008, bringing the total number of affiliated CSDs to seven. Euroclear also owns EMXCo, a provider of investment-fund order routing in the UK and Xtrakter, the owner of the TRAX trade matching and reporting system.

Euroclear SA/NV (ESA) is the group's Belgium-based parent company. It owns the securities processing platforms that are currently under consolidation and provides various common services to the (I)CSDs. While the

oversight/supervision of the (I)CSDs is still carried out on an individual basis by each competent authority in line with their national regulatory framework, an international cooperative agreement involving the same authorities has been set up for coordinating the regulatory initiatives relating to the common services that ESA provides for the group's CSDs. Apart from their national responsibilities towards Euroclear Bank and Euroclear Belgium, the Belgian authorities are also in charge of coordinating this multilateral cooperation process⁽¹⁾.

The NBB securities settlement system, which enables the processing of securities predominantly issued by the Belgian government, also falls under the central bank's oversight competence, the team in charge of this function being fully separated (up to executive board level) from that operating the system.

1.1 Cooperative oversight of ESA

Monitoring implementation of the Euroclear group's strategic programmes has continued to be one of the top priorities of the assessment programme, as jointly agreed by the regulatory authorities.

(1) NBB, Financial Stability Review, 2007, 89-92.

Box 1 – Euroclear consolidation programme

The consolidation of the services provided by the Euroclear group onto a Single Platform aims at making cross-border settlement both cheaper and more efficient. The benefit of the Single Platform lies in the fact that it integrates the full range of securities processing – including settlement, corporate actions, collateral management and reporting services – for multiple markets into a single operating environment accessed through a single interface. It will also provide an open and flexible solution to operate alongside, and interact with, other settlement systems in Europe. This, together with the harmonisation of practices and services across all the markets covered by the group, transforms fragmented markets into a virtual single market.

In the framework of the Euroclear Business Model, service provision will be composed of a “domestic service”, covering the services offered by Euroclear CSDs for group securities (securities for which a Euroclear group CSD acts as the primary CSD) and a “full service” consisting of Euroclear Bank services for group securities and non-group securities.

Given the size of the Single Platform programme, its implementation has been divided into four main phases in order to reduce launch risks and to avoid potential market disruption:



- The **Single Settlement Engine (SSE)**, which was fully launched in early 2007, has replaced the previous (I)CSD core settlement applications. It is the foundation for the future consolidation of all IT systems within the group.
- **Euroclear Settlement of Euronext-zone Securities (ESES)** provides clients of Euronext-zone market CSDs (Euroclear Belgium, Euroclear France and Euroclear Nederland) with an integrated settlement solution for stock exchange and over-the-counter business. The ESES platform has been fully implemented in the three markets since the beginning of this year.
- **Single Platform Custody** will provide harmonised group custody services. According to the current plans, the gradual migration to this common platform will be initiated from the beginning of 2010. Its implementation will go hand in hand with the further roll-out of the Common Communication Interface (CCI) that will enable clients within the group to access all Euroclear services through a single interface.
- **Single Platform Settlement** was initially contemplated as the final stage of the consolidation process intending to provide harmonised group settlement services including matching and life cycle management. The changing financial landscape has however led Euroclear to revise this roll-out plan and to concentrate on the harmonisation of the value added services that complement core settlement activity. This latter will remain delivered on the different legacy platforms and will also be available later through Target2-Securities (T2S), with CCI allowing the clients to initiate and monitor their activity through a single channel.

It should be clarified that the consolidation process has also reshaped the data centre infrastructure shared by the whole group⁽¹⁾ since the end of 2007. This new infrastructure, based on a triple data centre architecture⁽²⁾, replaces the various processing sites that were previously operated by each (I)CSD of the group. It has been designed to upgrade the business continuity and the disaster recovery at group level.

(1) With the exception of the Nordic CSDs.

(2) Not yet available for all CSDs.

Specific attention has been paid during the period under review to the migration of Euroclear Belgium and Euroclear Nederland to the Euroclear Settlement for the Euronext-zone Securities (ESES) platform which took place at the beginning of 2009⁽¹⁾. The ESES platform for Euroclear France users has been up and running since November 2007. This common IT platform allows the three ESES CSDs to handle cross-border transactions in the same way as domestic transactions, by sharing harmonised business processes and practices both for stock exchange and OTC trades (see box 1). From a legal perspective, the three respective CSDs remain distinct entities, subject to local laws and regulations and supervisory regime. The coordination among the ESES authorities regarding oversight of the ESES CSDs takes place through the ESA cooperative framework. This coordination has been effective for the follow-up of open issues of common interest, as identified in the framework of the earlier coordinated assessment of ESES functionalities, as well as for the close

monitoring of the preparatory steps to the final migration of the platform.

Another priority of the yearly assessment programme concerns the follow-up of the implementation of the production stability plan that was developed by ESA in order to enhance production stability levels across the group. This plan includes several initiatives to reduce the probability of production incidents by seeking structural solutions.

The soundness of the intra-group outsourcing relationships that have been set up as part of the corporate restructuring of the Euroclear group, giving ESA the role of service provider for the group's (I)CSDs, is a third major point of attention. These outsourcing relationships are governed by specific contractual arrangements describing in particular the level of service which the subsidiaries expect to receive from ESA. The main conclusion from the coordinated assessment was that the service delivery has adequately satisfied the criteria as set out in the outsourcing framework and that the (I)CSDs are effectively

(1) On 19 January 2009.

in a position to keep the process under their control. In the same context, the NBB has developed an outsourcing evaluation methodology applicable for all types of infrastructure covered by the oversight and encompassing all kinds of outsourced activities as well as all categories of service providers. This methodology, like that previously developed for the risk assessment of the links⁽¹⁾, is intended to offer a comprehensive and structured approach to guide the overseer beyond the high level outsourcing principles as derived from the applicable CPSS-IOSCO standards.

1.2 Oversight of Euroclear Bank

Euroclear Bank offers securities settlement and custody services in domestic and international securities, including triparty collateral management services.

Further details on the outcome of the updated compliance assessment of Euroclear Bank against the CPSS-IOSCO Recommendations carried out in the course of this year can be found further on in this chapter (see article: The Assessment of Euroclear Bank (ICSD) against the CPSS-IOSCO Recommendations).

In the framework of this assessment, there has been constant focus on the review of Euroclear Bank's liquidity policy, both in normal and extreme circumstances, and more particularly on its capacity to ensure timely settlement in stress situations. Another frequent area of attention is the risk assessment of the links network allowing Euroclear Bank's participants to settle foreign securities issued or registered in foreign (I)CSDs. As Euroclear Bank accepts securities from almost 40 markets worldwide in its system, these links are a key element of the Euroclear Bank business model. In order to assess whether Euroclear Bank complies with CPSS-IOSCO Recommendation 19, the NBB makes use of the detailed risk analysis framework it has developed⁽¹⁾. The effective compliance of Euroclear Bank's risk policy and procedures with this framework is verified by selecting each year a number of links for which a detailed compliance assessment is initiated.

One of the main links of Euroclear Bank is the so-called Bridge with the ICSD Clearstream Banking Luxembourg (Clearstream). To settle transactions between their respective participants, each ICSD extends credit to the other system. In accordance with CPSS-IOSCO Recommendation 19, credit extensions between linked (I)CSDs should be fully secured and subject to limits. Euroclear Bank relies on a range of various risk mitigation instruments in order to observe this requirement. The introduction of new mitigation tools has been

accompanied by a further enhancement of the interoperability between the ICSDs. Such developments have enabled Euroclear Bank to better ensure both observance of the full securitisation requirement of the credit extensions and a high degree of settlement efficiency. Given their common interest, the NBB is working on these matters in close cooperation with the Luxembourg regulatory authorities.

Euroclear has also set up a crisis simulation exercise, and the NBB was involved in the preparations. This exercise was an important element of the so-called Master Crisis Plan initiated by Euroclear some years ago (on request of the NBB) in order to thoroughly assess the system's ability to cope with extreme situations and to adapt, where needed, its contingency risk management framework.

The resilience of the system has also been exposed to a real-life crisis situation with the failure of Lehman Brothers in September. The risk policy and management procedures have proven to be effective in absorbing the several shocks induced by the effects of the financial crisis. Since the outbreak of the current crisis in the financial markets in 2007 and especially since its intensification in the second half of 2008, the NBB has closely monitored its impact on the overall functioning and performance of the Euroclear system. Oversight activities in 2009 will specifically address the lessons drawn in the post-mortem analyses that relate essentially to further improvement of several contingency operational procedures.

Finally, in its capacity as "first assessor", the NBB has updated the assessment of Euroclear Bank along the user standards developed by the ESCB, in the framework of the settlement of its monetary policy transactions. This review, which takes place every two years, raised no specific concern in terms of compliance. The eligibility of the Euroclear Bank system should therefore be reconfirmed.

1.3 Oversight of Euroclear Belgium

With respect to Euroclear Belgium, the most important development concerns its successful migration to the ESES platform in January 2009. The NBB's oversight initiatives in this field have been closely coordinated with the other ESES countries' authorities, in view of the common relevance of most of the oversight issues at stake. Besides the follow-up work on the initial assessment of the ESES functionalities against the CPSS-IOSCO standards, specific attention has been paid to harmonisation of the three

(1) NBB, Financial Stability Review, 2006, 123-140.

CSDs/SSSs' legal and regulatory documentation as well as to the ESES governance and management synergy project. This project, which aims to achieve greater coordination in decision-making across the CSDs through harmonisation of the governance structure, was implemented shortly after the ESES platform launch.

1.4 Oversight of NBB-SSS

During the period under review, the NBB-SSS has undergone the renewed users' assessment designed to update the list of securities settlement systems (SSS) eligible for the settlement of collateral for Eurosystem credit operations. The NBB-SSS passed the assessment and therefore remains on the updated list of eligible SSSs as published by the ECB on its website on 19 December 2008.

One major change was made to the NBB-SSS operational model in 2008, namely its transformation as an ancillary system (AS) of TARGET2 (T2). From 8 December 2008 onwards, the NBB-SSS as an ancillary system has been directly linked to T2 and performs the cash settlement part of its securities transactions according to the integrated model. This key development went very smoothly, thanks to the extensive preparation phase that preceded it with the help of all NBB-SSS participants. Preparations

included information sessions, testing activities, as well as the final certification that each participant is required to obtain.

2. Oversight of payment systems

2.1 Oversight of card payment schemes

A Eurosystem-wide oversight exercise devoted to the assessment of card payment schemes (CPS) active within the euro area was launched in May 2008. Its aim is to gauge the extent of each CPS's compliance with the standards defined in the Oversight Framework for Card Payment Schemes⁽¹⁾.

Thirty-three CPSs are present in the euro area, six of which are international (i.e. Visa Europe, MasterCard Europe, American Express, Diners/Discover, JCB/Japan, CUP/China) and twenty-seven national schemes, spanning thirteen countries. A waiver exempts schemes with limited activity from the application of the oversight standards⁽²⁾. Seven CPSs, including two international schemes, have been exempted on the basis of that waiver. The oversight framework is consequently now applied to twenty-six CPSs .

The place of establishment of the national CPS's governance authority⁽³⁾ determines the national central bank (NCB) in charge of its oversight. Due to the cross-border nature of its activities, an international CPS is subject to cooperative oversight carried out by an assessment group, the latter being made up of a lead overseer NCB and other volunteering NCBs having a special interest in the activities of the scheme in question.

(1) For an overview of the oversight standards for CPSs, see "Oversight of CPSs: 2.2. Standards for card schemes", the NBB's 2008 Financial Stability Review, 84-85.

(2) The waiver applies to a CPS if the latter meets one of the two following criteria: (a) the sum of cards in issue is on average less than one million per year, over the past three years, or (b) the CPS has an annual average value of transactions of less than € 1 billion, over the past three years.

(3) The governance authority is the CPS body accountable for its overall functioning and coherence; it should ensure that all other stakeholders follow the rules and apply relevant measures.

Box 2 – Short description of the NBB-SSS settlement process in TARGET2 (T2)

The liquidity needed for the day is transferred out of T2 by the NBB-SSS participants at the beginning of the day. This liquidity is then stored on cash accounts (called DLNS accounts for "Dedicated Liquidity NBB-SSS" accounts) managed by the NBB-SSS itself on its own platform. At the end of each settlement batch, the money is exchanged between the cash accounts of the participants concerned by the settled securities transactions.

Cash transfers are possible during the working day between T2 and the NBB-SSS (in both directions) upon the initiative of the NBB-SSS participants.

At the end of the booking date, namely after the final settlement batch, the resulting cash positions are transferred back by the NBB-SSS itself to the cash accounts of the NBB-SSS participants on the T2 SSP.

The National Bank of Belgium assumes the role of “lead overseer within the eurosystem” for MasterCard Europe as this international CPS is headquartered in Belgium, while the ECB is the lead overseer for Visa Europe, American Express and Diners/Discover, all three established outside the euro zone. Regarding the Belgian CPS “Bancontact-MisterCash” (BC-MC), the National Bank of Belgium naturally remains in charge of oversight which will in future be carried out according to the new framework referred to in the first paragraph.

Confidential treatment of the information collected from the CPSs is ensured through appropriate arrangements drawn up by the Eurosystem. For international CPSs, Memoranda of Understanding have to be signed by the overseen entity and the lead overseer, on the one hand, as well as between the lead overseer (an Eurosystem NCB) and any EU NCB which is not part of the Eurosystem interested in receiving confidential information on a need-to-know basis, on the other hand. For national CPSs, similar arrangements remain within the competence of the respective NCB in charge. This explains why the existing protocol between Brand & Licence Company (BLC), the governance authority of BC-MC, and the National Bank of Belgium, signed in 2006, remains in force.

In order to further enhance the consistency and comparability of assessments, additional oversight tools have been developed for the collection and evaluation of the necessary information and the assignment of an observance level for each of the five oversight standards. Those tools comprise an “Assessment Methodology” (details about the features of the assessment, as well as the list of questions to be answered), an “Assessment Guide” and finally the “Assessment Criteria for card payment scheme compliance to oversight standards”, the last two being reserved for the exclusive use of the overseers. As such, they complement the oversight standards for CPSs. With the aim of preserving the necessary level playing field (equal application of oversight standards) in such a highly competitive sector, the assessment report for each individual national and international CPS will be subject to a peer review (i.e. cross-checking per standard by one or two NCB(s) that had not been involved in the original assessment).

In order to ensure close monitoring of CPS activities, the Eurosystem finalised in 2008, alongside the launch of the assessment exercise, a statistical framework with particular focus on fraud. Data collection is expected to provide the Eurosystem with additional quantitative substance for effectively evaluating financial and operational risks and, if need be, for shaping future fraud prevention policies.

2.2 Oversight of the centre for Exchange and Clearing

The Centre for Exchange and Clearing (CEC) is the Belgian automated interbank retail payments system. It is a net settlement system where participants' balances are settled once a day. The CEC processes 99.75% of the volume of all interbank giro payments in Belgium (amounting to 2 p.c. in value)⁽¹⁾, notably including those resulting from the activities of the Belgian CPS BC-MC mentioned in the previous section.

Like the external payment and settlement systems, those managed by the NBB, like the CEC, are included in the scope of the NBB's oversight activities⁽²⁾. In 2008, oversight of the CEC focused on financial risk management. Although this domain had already been assessed previously, this NBB initiative was justified by the migration of the CEC settlement process to the TARGET2 platform in October 2008, the interrelation with the settlement of BC-MC and the peculiar market conditions that prevailed in the second part of the year. Improvements to the financial risk management mechanisms and procedures are currently being examined at the CEC level.

3. Oversight of service providers: SWIFT

The NBB acts as lead overseer of SWIFT, as SWIFT is incorporated in Belgium. The oversight of SWIFT is performed in cooperation with the G10 central banks. SWIFT is not a payment system but a key messaging provider for payment and securities settlement infrastructures throughout the world. Central bank oversight of SWIFT is necessary in view of its crucial importance for the safety and efficiency of payment and securities settlement systems.

The practical arrangements for the oversight of SWIFT were described in the NBB's 2005 Financial Stability Report. The 2007 issue of the FSR presented the High Level Expectations for the Oversight of SWIFT, which constitute the framework for reviewing SWIFT's activities falling within the scope of oversight.

In 2008, SWIFT provided overseers with its first self-assessment report regarding the High Level Expectations (HLEs). SWIFT's demonstration of compliance with the HLEs does not represent the overseers' opinion, but SWIFT's own assessment of how it lives up to the HLEs.

(1) More detailed information on the CEC can be found on the NBB website www.nbb.be under the theme *Payment Systems*.

(2) In order to avoid any conflict of interest, a specific organisational structure is in place to keep oversight separate from operational activities up to the highest levels of hierarchy.

In the fourth quarter of 2007, SWIFT announced an overhaul of its messaging infrastructure, including plans to move over to a multi-zonal messaging architecture. The new topology would enable multiple processing zones, making it possible for intra-zone messages to stay within their region of origin. This major project to move to a distributed SWIFT architecture is split into two phases. In the first stage, two message processing zones are being created, namely the European and Trans-Atlantic zones. Country allocation to processing zones was determined in 2008. An additional SWIFT operating centre is being set up for the European zone, and should be operational by the end of 2009. In addition, SWIFT is planning to have a command and control capability in Asia, to allow its operations to be run from there, as well as from Europe and from the US. The second phase of the distributed architecture project consists in the roll-out of a new global SWIFT operating centre.

SWIFT oversight activities in 2008 focused primarily on the monitoring of this distributed architecture project. Aspects reviewed included the resilience features of the new architecture, the organisation of project management, the monitoring of project milestones, testing strategies, and customer communication plans.

SWIFT commercially launched Alliance Lite in the fourth quarter of 2008. Alliance Lite is an internet-based, low-cost access to SWIFT targeted at new, low-volume

customers such as corporates and financial institutions. Overseers reviewed Alliance Lite while assurance was sought from SWIFT that this new connectivity mechanism would not introduce unacceptable risks to the core SWIFT applications, i.e. SWIFTNet and FIN. The review will continue in 2009.

Other areas of specific SWIFT oversight attention include cyberdefence, IT audit activities, security risk management and enterprise risk management.

SWIFT traffic grew by 10 p.c. in 2008. Growth was strong in the first quarter, slowed down from April to August, and picked up very strongly in September and October, but then fell back in November and December. Strong traffic growth in September and October and the subsequent weaker growth are both related to the financial turmoil: while the high volatility of markets initially triggered more messaging, the reduction of activity in interbank markets that followed also resulted in weaker messaging growth at SWIFT. Overseers will continue to monitor the evolution of SWIFT traffic growth carefully in the context of the global financial turmoil. Likewise, the financial position of SWIFT was monitored more closely in 2008 and this will also be the case next year. SWIFT's current financial position is strong, with all investments, including the major distributed architecture project, being funded out of operating cash flow.

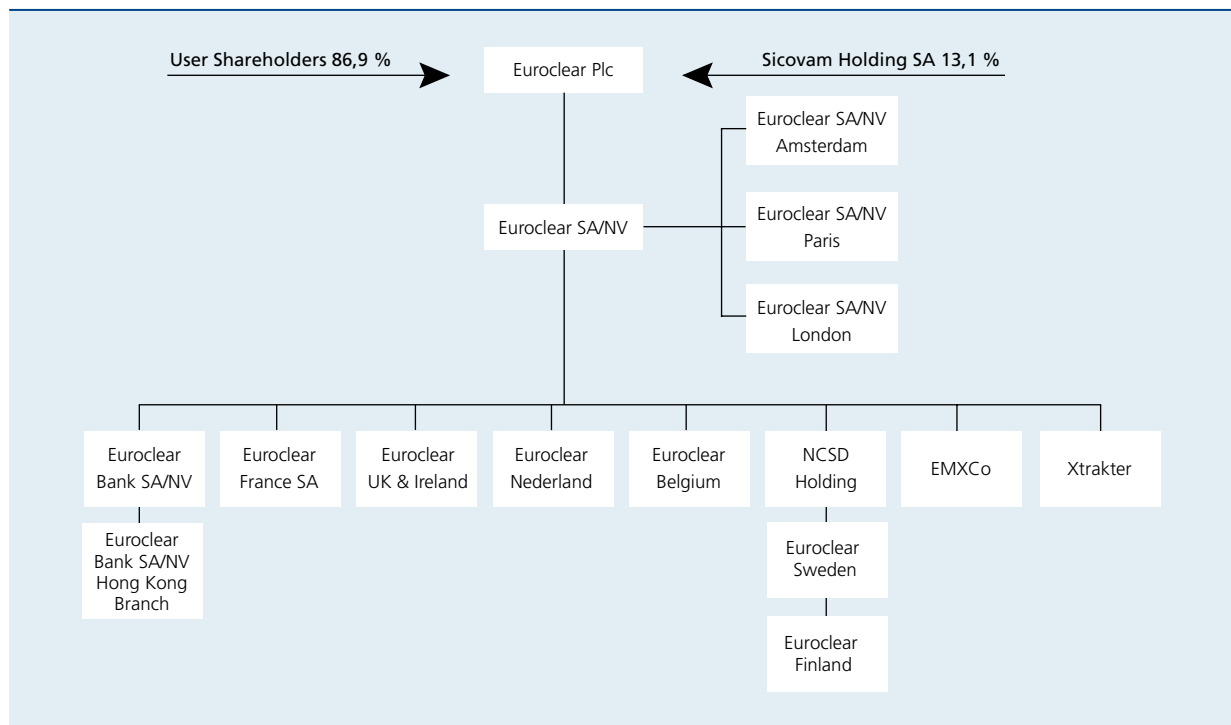
The assessment of Euroclear Bank (ICSD) against the CPSS-IOSCO Recommendations

This assessment of Euroclear Bank is based on the CPSS-IOSCO Recommendations for Securities Settlement Systems⁽¹⁾ that were issued in 2001 with the objective of contributing to financial stability by strengthening the securities settlement systems (SSS) that are an increasingly important component of the global financial infrastructure. The related methodology⁽²⁾ provides a clear and comprehensive framework for the conduct of the assessments with four possible assessment

categories (“Observed”, “Broadly observed”, “Partly observed” and “Non-observed”) aiming to define to what extent the system complies with each Recommendation.

(1) “Recommendations for Securities Settlement Systems”, CPSS-IOSCO, November 2001 (available on the website of the Bank for International Settlements: www.bis.org)

(2) “Assessment Methodology for the Recommendations for SSSs”, CPSS-IOSCO, November 2002 (available on the website of the Bank for International Settlements: www.bis.org)



Source: www.euroclear.com

In the EU, this set of standards is to be replaced by the ESCB-CESR Recommendations in the near future.

The Euroclear group encompasses six domestic central securities depositories (CSD) and one international central securities depository (ICSD), Euroclear Bank, a Belgian credit institution, which operates the securities settlement system called the Euroclear System. The group's CSDs are Euroclear UK & Ireland, Euroclear France, Euroclear Nederland and Euroclear Belgium as well as Euroclear Sweden and Euroclear Finland which joined the group at the end of 2008. These seven entities are owned by Euroclear SA, which acts as services provider to the group (I)CSDs (see diagram before).

The NBB is responsible for the oversight of the securities settlement systems operated by the Belgian entities of the group, namely the Euroclear system and those operated by Euroclear Belgium for the settlement of Euronext Brussels stock exchange and over-the-counter transactions.

In the framework of these responsibilities, the NBB updated during the last quarter of 2008 its CPSS-IOSCO assessment of Euroclear Bank. The outcome is summarised below. Such disclosure is promoted by the CPSS-IOSCO methodology and should enhance the transparency on the NBB's regulatory role for the settlement system participants. By disclosing the results of this assessment, the NBB also intends to promote its own accountability as overseer of payment and securities settlement systems.

Box 1 – The CPSS-IOSCO Recommendations for SSSs

I. Legal risk

The legal framework applicable to an SSS's operation is highly important for its reliability and predictability. Legal risks may cause one party to a trade to suffer losses because laws or regulations do not support the rules of the securities settlement system or the property rights and other interests held through the settlement system.

1. Legal framework

Securities settlement systems should have a well founded, clear and transparent legal basis in the relevant jurisdictions.

II. Pre-settlement risk

Pre-settlement risk refers to the risk that an outstanding transaction for completion at a future date will not settle because one of the counterparties fails to perform on the contract or agreement during the life cycle of the transaction before settlement. The resulting exposure is the cost of replacing the original transaction at current market prices. This risk can be mitigated by trade confirmation mechanisms, shorter settlement cycles, the use of a central counterparty or the possibility to lend securities.

2. Trade confirmation

Confirmation of trades between direct market participants should occur as soon as possible after trade execution, but no later than trade date (T + 0). Where confirmation of trades by indirect market participants (such as institutional investors) is required, it should occur as soon as possible after trade execution, preferably on T + 0, but no later than T + 1.



3. Settlement cycles

Rolling settlement should be adopted in all securities markets. Final settlement should occur no later than T + 3. The benefits and costs of a settlement cycle shorter than T + 3 should be evaluated.

4. Central counterparties (CCPs)

The benefits and costs of a CCP should be evaluated. Where such a mechanism is introduced, the CCP should rigorously control the risks it assumes.

5. Securities lending

Securities lending and borrowing (or repurchase agreements and other economically equivalent transactions) should be encouraged as a method for expediting the settlement of securities transactions. Barriers that inhibit the practice of lending securities for this purpose should be removed.

III. Settlement risk

Settlement risk is a general term used to designate the risk that settlement in a SSS will not take place as expected, e.g. because a party will default on one or more settlement obligations to its counterparties or to a settlement agent.

6. Central securities depositories (CSDs)

Securities should be immobilised or dematerialised and transferred by book entry in CSDs to the greatest extent possible.

7. Delivery versus payment (DVP)

CSDs should eliminate principal risk by linking securities transfers to funds transfers in a way that achieves delivery versus payment.

8. Timing of settlement finality

Final settlement should occur no later than the end of the settlement day. Intraday or real-time finality should be provided where necessary to reduce risks.

9. CSD risk controls to address participants' failures to settle

CSDs that extend intraday credit to participants, including CSDs that operate net settlement systems, should institute risk controls that, at a minimum, ensure timely settlement in the event that the participant with the largest payment obligation is unable to settle. The most reliable set of controls is a combination of collateral requirements and limits.



10. Cash settlement assets

Assets used to settle the ultimate payment obligations arising from securities transactions should carry little or no credit or liquidity risk. If central bank money is not used, steps must be taken to protect CSD members from potential losses and liquidity pressures arising from the failure of the cash settlement agent whose assets are used for that purpose.

IV. Operational risk

Operational risk is the risk of a human error, or of a breakdown or deficiency of the hardware, software or communications systems that are crucial to the settlement process. It covers both operational reliability and business continuity issues.

11. Operational reliability

Sources of operational risk arising in the clearing and settlement process should be identified and minimized through the development of appropriate systems, controls and procedures. Systems should be reliable and secure, and have adequate, scalable capacity. Contingency plans and backup facilities should be established to allow for timely recovery of operations and completion of the settlement process.

V. Custody risk

Custody risk is the risk of loss of securities held in custody occasioned by the insolvency, negligence or fraudulent action of the custodian or of a subcustodian.

12. Protection of customers' securities

Entities holding securities in custody should employ accounting practices and safekeeping procedures that fully protect customers' securities. It is essential that customers' securities be protected against the claims of a custodian's creditors.

VI. Other issues

13. Governance

Governance arrangements for CSDs and CCPs should be designed to fulfil public interest requirements and to promote the objectives of owners and users.

14. Access

CSDs and CCPs should have objective and publicly disclosed criteria for participation that permit fair and open access.



15. Efficiency

While maintaining safe and secure operations, securities settlement systems should be cost-effective in meeting the requirements of users.

16. Communication procedures and standards

Securities settlement systems should use or accommodate the relevant international communication procedures and standards in order to facilitate efficient settlement of cross-border transactions.

17. Transparency

CSDs and CCPs should provide market participants with sufficient information for them to identify and evaluate accurately the risks and costs associated with using the CSD or CCP services.

18. Regulation and oversight

Securities settlement systems should be subject to transparent and effective regulation and oversight. Central banks and securities regulators should cooperate with each other and with other relevant authorities.

19. Risks in cross-border links

CSDs that establish links to settle cross-border trades should design and operate such links to reduce effectively the risks associated with cross-border settlements.

1. The Euroclear system

The system operated by Euroclear Bank provides international central securities depository (ICSD) services, including new issues distribution to major financial institutions located in more than 80 countries. In addition, it offers other securities-related services such as custody, securities lending, collateral management and money transfers. The participants can settle trades by book entry in 52 settlement currencies on a delivery-versus-payment basis. There are over 480,000 different issues of securities accepted in the Euroclear system which are issued by entities from over 110 countries and cover a broad range of internationally traded fixed- and floating-rate debt instruments, convertibles, warrants and equities.

In 2004, in the framework of its oversight of the Euroclear system, the NBB assessed for the first time this system against the CPSS-IOSCO Recommendations. It was concluded that the Euroclear system was fully

compliant with fifteen of these Recommendations. For two other Recommendations (Recommendations 9 and 19), improvements had to be implemented to achieve full compliance. Finally, two Recommendations were considered not relevant for Euroclear Bank, as they deal with aspects (trade confirmation, settlement cycle) for which Euroclear Bank bears no responsibility. The results of this assessment were made public in 2005⁽¹⁾.

Following this first assessment, an action plan was drawn up in consultation with Euroclear Bank, the system operator. It listed not only the actions that had to be implemented in order to achieve the full compliance of the Euroclear system but also additional requests, deriving from a stricter interpretation of the CPSS-IOSCO requirements but also deemed desirable to be achieved from an oversight perspective.

(1) "Assessment of the Euroclear System against CPSS-IOSCO Recommendations for Securities Settlement Systems", NBB Financial Stability Review 2005, 105-113.

Since then, the NBB has further evolved in the way it relies on the CPSS-IOSCO Recommendations for overseeing the Euroclear system. The CPSS-IOSCO Recommendations are meant as generic standards that should apply for all systems worldwide; however, some of the activities of an ICSD are so specific that the NBB judged it necessary to set additional requirements which go beyond the CPSS-IOSCO requirements. This approach was supported and underpinned by the 2008 CPSS report entitled “The interdependencies of payment and settlement systems”, which recommends *inter alia* that system operators should regularly:

- review the risks they bear from and pose to the other entities as a result of interdependencies;

- assess whether their risk management tools are proportionate to risks they bear from and pose to the other interdependent entities;
- review whether their crisis management arrangements allow effective coordination among interdependent entities.

In this context, the NBB’s oversight focus has been on:

- achieving full compliance with Recommendation 19 for the Bridge with Clearstream;
- going beyond the requirements of standard 9 for credit and liquidity risk management, including the development of extreme stress scenarios;
- improving the operational resilience beyond the requirements of Recommendation 11.

TABLE 1 SUMMARY OF THE RESULTS OF THE ASSESSMENT OF EUROCLEAR BANK AGAINST CPSS-IOSCO RECOMMENDATIONS

| Recommendation | | Assessment category |
|--------------------------------|---|---|
| I. Legal risk | | |
| Recommendation 1 | Legal framework | Observed |
| II. Pre-settlement risk | | |
| Recommendation 2 | Trade confirmation | Not relevant |
| Recommendation 3 | Settlement cycles | Not relevant |
| Recommendation 4 | Central counterparties (CCPs) | Observed |
| Recommendation 5 | Securities lending | Observed |
| III. Settlement risk | | |
| Recommendation 6 | Central securities depositories (CSDs) | Observed |
| Recommendation 7 | Delivery versus payment (DVP) | Observed |
| Recommendation 8 | Timing of settlement finality | Observed |
| Recommendation 9 | CSD risk controls to address participants’ failures to settle | Observed |
| Recommendation 10 | Cash settlement assets | Observed |
| IV. Operational risk | | |
| Recommendation 11 | Operational reliability | Observed |
| V. Custody risk | | |
| Recommendation 12 | Protection of customers’ securities | Observed |
| VI. Other issues | | |
| Recommendation 13 | Governance | Observed |
| Recommendation 14 | Access | Observed |
| Recommendation 15 | Efficiency | Observed |
| Recommendation 16 | Communication procedures and standards | Observed |
| Recommendation 17 | Transparency | Observed |
| Recommendation 18 | Regulation and oversight | Observed |
| Recommendation 19 | Risks in cross-border links | Observed for all links except German link: Non-observed |

It appears relevant to update Euroclear's compliance with the CPSS-IOSCO Recommendations for two basic reasons:

- Euroclear has made good progress with respect to the Recommendations where full compliance was not achieved in 2004;
- the developments more directly associated with the pursuit of the consolidation process within the Euroclear group, in particular in the IT domain, including the effective implementation of the new data centres infrastructure relying on three sites.

As highlighted in the table above, the Euroclear system remains fully compliant with the same fifteen Recommendations as before. Further improvements may even be noted for some of them, such as for Recommendation 11 on operational reliability.

Progress has also been made with respect to the Recommendations where full compliance was previously not achieved, as well as with the additional requests that were issued at the time of the 2004 assessment.

Legal risk (Recommendation 1)

As already assessed in 2004, the settlement and custody activities of the Euroclear system are governed by consistent, clear and solid laws, rules and procedures. They provide an adequate legal basis in particular for the enforceability of transactions, the protection of Euroclear Bank participants' assets, the immobilisation of securities as well as their holding, the securities lending and the delivery-versus-payment (DVP) settlement mechanisms with finality. The rules also cover the event of a participant's default, including the effective use of collateral, and are legally enforceable. The legal framework of the Euroclear system is therefore compliant with Recommendation 1.

Pre-settlement risk (Recommendations 2, 3, 4 and 5)

The Euroclear system settles stock exchange and over-the-counter trades concluded on various domestic and international markets. Rules and practices regarding pre-settlement aspects such as trade confirmation, settlement cycles or the use of a CCP are defined by these markets themselves. Euroclear Bank has no responsibility for these rules and practices, neither as an international central securities depository nor as a securities settlement system. Recommendations 2 and 3 are therefore not relevant in the framework of the assessment of the Euroclear system. Recommendation 4 is still assessed as

observed, considering that the business case for the possible recourse to a CCP mechanism for Eurobonds remains monitored. Euroclear provides its participants with the Securities Lending and Borrowing Programme, a securities lending facility that is fully automated and integrated into the settlement process which aims is to expedite settlement of securities transactions and thereby reduce pre-settlement risk. Recommendation 5 on securities lending is "Observed" by the Euroclear system.

Settlement risk (Recommendations 6, 7, 8, 9 and 10)

The CPSS-IOSCO Recommendations tackle settlement risk issues by requesting SSSs to provide for immobilisation or dematerialisation of securities, to have effective DVP mechanisms with intraday and real-time settlement finality in place, to be clear and transparent about the timing of settlement finality, and to use cash settlement assets which are as safe as possible (i.e. carrying little credit risk). The Euroclear system is fully compliant with these Recommendations.

Recommendation 9 on system risk controls to address participants' failure to settle concerns the credit and liquidity policies of the system operator. In the former assessment, full compliance of the Euroclear system was not achieved because debit balances on participants' securities accounts were possible in specific circumstances. Euroclear Bank has now implemented a new procedure enabling such accounting practices to be avoided. This improvement has made it possible to upgrade the assessment to the scoring *Observed*. Euroclear Bank remains compliant with the collateral and limits requirements for credit exposures.

As far as liquidity policy is concerned, Euroclear Bank has improved its tools to assess its liquidity needs and resources as well as to demonstrate its effective capacity to sustain liquidity shocks. In the context of the requirement to have sufficient liquidity resources to ensure timely settlement, the NBB discussed with Euroclear Bank further refinements of its approach, in particular by contemplating a wider range of worst-case scenarios, both in terms of access to the liquidity sources and in terms of maximum exposure to the liquidity risk. An action plan encompassing such additional requirements has been developed and is being gradually implemented. Additionally, the ongoing debate on the lessons drawn from the management of the financial crisis has contributed to the evolution of the current contingency liquidity policy. These other aspects will also be part of the follow-up work.

Operational risk (Recommendation 11)

Since the corporate restructuring of the group, Euroclear Bank has outsourced its IT infrastructure, and development to Euroclear SA, the parent company acting as service provider for the entities of the group. In this new framework, Euroclear Bank remains fully compliant with the CPSS-IOSCO requirements for operational risk. Adequate governance arrangements and an operational risk policy aimed at effectively identifying, minimising, managing and controlling operational risks are in place. Technical incidents, as duly reported by Euroclear Bank, did not have any significant impact on the system's participants. Contingency plans and back-up facilities are in place in order to handle different contingency scenarios and they are regularly tested. In the framework of its consolidation, Euroclear has put in place a new data centre infrastructure at group level improving its disaster recovery and business continuity capacities. It enables in particular Euroclear group entities to better cope with a catastrophe having a regional or metropolitan impact. Euroclear Bank and Euroclear SA have also implemented a dual office model in which the companies' staff is divided between two distant locations, in such a way that if one of the two office facilities should become unavailable, the operation of the Euroclear system could continue from the remaining one.

Custody risk (Recommendation 12)

In order to ensure the protection of the customers' securities deposited in the Euroclear system, different technical and institutional solutions are in place, such as the facility whereby participants can segregate their own securities from those of clients. Securities movements with the depositories or local CSDs are monitored and the holdings with them reconciled regularly. Euroclear Bank has never experienced any case of insufficient balances of securities to meet any customer claim. In the event of Euroclear Bank becoming insolvent, the law protects participants against the claims of the Bank's creditors. When selecting depositories outside Belgium, Euroclear Bank ensures through specific depository agreements legal opinions that recovery of the underlying securities held through local depositories can be enforced, notwithstanding the insolvency of such local depositories or of the local CSD.

Other issues (Recommendations 13, 14, 15, 16, 17, 18 and 19)

The CPSS-IOSCO Recommendations also cover various issues not directly related to a specific type of risk. As was already the case in the 2004 assessment, the Euroclear system remains fully compliant with the CPSS-IOSCO requirements relating to these issues, with the exception of one market link. For this last item, significant improvements have nevertheless been noted compared to the previous assessment. These issues are briefly described in the remainder of this article:

Governance

The governance arrangements of the Euroclear system have evolved with the group corporate restructuring of 2005. The system remains owned and governed by its participants. These arrangements promote the objectives of owners and users. They are clearly specified and transparent to users and owners. Participants are regularly consulted by Euroclear, which invites them to express their views on major changes. This is for instance the case for the setting-up of Euroclear's new business model. Since the beginning of 2008, in compliance with the CBFA circular, Euroclear Bank's governance memorandum is available on its website dedicated to participants.

Access

The Euroclear system accepts a heterogeneous range of participants. By the end of 2008, 1,350 institutions, based in more than 80 different countries, were participants of the system. Clear and publicly disclosed admission criteria for the Euroclear system are defined in the admission policy. These criteria, which apply to all the system's participants regardless of their identity, type and location, relate to the financial resources of the applicants, their technology capability, their need for and potential use of the Euroclear system, their reputation in the market and their anti-money-laundering programme.

Efficiency

Euroclear Bank has set up procedures to lower and monitor the Euroclear system's costs, with the objective of remaining cost-effective and reviewing pricing levels whenever deemed appropriate. Service levels are also monitored by Euroclear Bank (e.g. through a yearly customer satisfaction survey and various benchmarks) in order to improve them wherever appropriate.

Communication procedures and standards

The Euroclear system uses two communication channels, namely EUCLID, the proprietary system developed by Euroclear, and SWIFT, the secure messaging service provider. Settlement instructions, as well as instructions for other services, are compliant with the ISO 15022 standard. Such compliance with international standards is requested by Recommendation 16.

Transparency

Recommendation 17 states that the system should provide its participants with sufficient information in order to accurately evaluate risks and costs associated with their participation. This Recommendation is observed by Euroclear, which provides this information in its contractual documentation as well as in other documents available on its website. Transparency is also achieved by Euroclear's yearly publication of its answers to the questionnaire from the CPSS-IOSCO disclosure framework and the publication by NBB of the results of the CPSS-IOSCO assessment. Some improvements are nevertheless expected in the transparency of the rules governing management of extreme events.

Regulation and oversight

As a securities settlement system, the Euroclear system is overseen by the NBB. Its operator, Euroclear Bank, as operator of the system as well as Euroclear SA, the parent company providing the common services to the group's (I) CSDs, are both supervised by the CBFA, the Belgian supervisory authority. The roles and tasks of the NBB and the CBFA are clearly defined in laws and their cooperation in the field of clearing and settlement was made transparent to the Euroclear system. A cooperative structure is in place between the regulators of the Euroclear group countries in order to coordinate oversight/supervision of ESA⁽¹⁾.

Risks in cross-border links

Euroclear Bank is closely linked with more than 40 (I) CSDs around the world. These links are a key element of the Euroclear system, providing its participants with the possibility to settle domestic securities with counterparties in the local market or within the Euroclear system itself. The previous assessment⁽²⁾ stated that Euroclear Bank had effectively conducted a risk assessment for each link, although a regular update of the initial analysis should be standardised. Since the last review, Euroclear Bank has

upgraded its risk analysis of links by adopting a formal procedure that allows a regular review of all relevant risks in cross-border links (i.e. legal, settlement and operational risks, financial strength and control environment). This procedure is in line with the NBB Risk Analysis Framework for cross-border (I)CSD links⁽³⁾. The overall rating for Recommendation 19 has therefore evolved from "*Broadly observed*" to "*Observed*". The NBB continues to monitor the implementation of the new framework on a case-by-case basis through detailed link assessments.

The link between Euroclear Bank and Clearstream Banking Luxembourg (referred to as the Bridge) has been upgraded with new settlement opportunities during the daytime, together with additional risk mitigation measures to secure credit risks or to reduce credit exposures between the two ICSDs. The new risk management framework has been gradually implemented with the purpose of ensuring full securitisation of credit positions, in compliance with the CPSS-IOSCO requirement ("*Observed*"). The renewal of this positive assessment will be conditional upon the outcome of the NBB's continuous monitoring on the effective full securitisation of the credit extensions to Clearstream and the application of limits, in all circumstances.

Lastly, compared with the 2004 assessment, provisional transfer risks have been removed for the market links with France, the US and Spain⁽⁴⁾. For the link with Germany, the residual risks related to provisional securities transfers before finality have been significantly reduced following upgrades of the settlement system in the local market by extending the number of settlement windows based on a central bank guarantee in 2005 and 2008. The final stage of the local market solution, fully eliminating provisional transfer risk in the local system, is expected to be implemented in 2009. Although Euroclear Bank has set up contingency procedures to cope with the effects of a hypothetical unwind in this market, this link remains rated as "*Non-observed*".

(1) "Cooperative oversight of Euroclear and SWIFT", NBB Financial Stability Review 2005, 95-103.

(2) See Financial Stability Review, 2005, 105-113.

(3) See Financial Stability Review, 2006, "Cross-border securities settlement and risk analysis framework for cross-border links", 123-140.

(4) For France the migration of Relit+ to ESES France, for the US a prohibition of a retransfer of provisionally received securities, for Spain a review of the procedures with the local custodian.

A central counterparty solution for credit default swaps

Steven Van Cauwenberge

Credit default swaps (CDS) – financial instruments which allow the buyer to insure against the default on a reference entity in return for the payment of a periodic fee to the seller – play an important role in the financial system. CDS markets are nowadays considered as one of the main channels through which credit risks are transferred and their good functioning is a key component of financial stability.

The potential counterparty risk as well as operational risks in CDS markets have become a major source of concern during the financial crisis. While several market-led solutions to cope with these risks have been developed in the last few years, either on a bilateral or a multilateral basis, market participants and supervisory authorities are still wondering whether the existing market infrastructures used to process credit derivatives and to follow-up their position are adequate and resilient enough. In recent months, the creation of a central clearing counterparty (CCP) for CDS has received wide support as this kind of infrastructure would considerably reduce counterparty and operational risks in CDS processing.

This article is structured as follow. The first section briefly describes the main characteristics of credit default swaps and their markets and lists the main existing issues in CDS processing. Section 2 considers enhancements which have been developed in the post-trade processing of CDS on a bilateral basis, while section 3 examines existing market infrastructures other than CCP. Section 4 highlights the benefits to be expected from a CCP in the post-trade processing of CDS. The last section concludes.

1. Credit Default Swaps

1.1 CDS characteristics

A CDS is a contract to trade credit risk on a reference entity. It enables the isolation and separate transfer of this credit risk. The protection buyer in the CDS pays a periodic fee to the protection seller in return for compensation for default or a comparable event of the reference entity.⁽¹⁾ The protection seller is paid a coupon or premium that is expressed as an annualised percentage of the notional value of the transaction and that is paid quarterly over the lifecycle of the transaction.

CDSs can be single-name swaps or multi-name instruments. Single-name CDSs reference to a single entity, being a corporate, a bank or a state; multi-name CDSs reference to a pool of reference names. The latter include CDS indices. The main standardised CDS indices are the CDX and iTraxx series. The most widely used indices for global CDS markets are the iTraxx Europe index (comprising the 125 most liquid European investment-grade corporate names) and the DJ CDX IG index (composed of the 125 most liquid North American investment-grade corporate names). Further, specific CDS index tranches reference to a distinct segment of the loss distribution of the underlying index.

(1) See, for example, the ISDA product definitions at www.isda.org. ISDA is the world's largest trade association for the privately negotiated derivatives industry and takes on a self-regulating function.

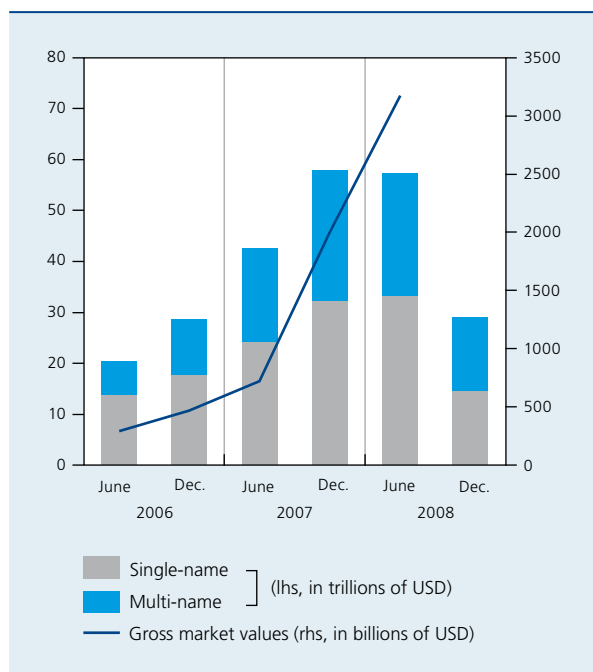
The most commonly traded CDS maturities are three, five and ten years, with the five-year maturity being especially active. Maturities nevertheless range to up to fifty years.

Like most financial derivatives, CDSs can be used by investors for hedging, arbitrating or position taking. CDSs offer a convenient way of shorting the bond of the reference entity by buying the CDS contract. CDSs are also one of the building blocks for structured products such as synthetic collateralised debt obligations (CDOs).

1.2 CDS markets

CDS markets have grown at a rapid pace until recently. At the end of 2002, notional amounts of CDSs outstanding came to 2 trillion US dollar, while by the end of December 2007, this figure was 57 trillion. This amount stabilised, up to June 2008, to fall subsequently to 29 trillion by the end of last year, while market participants sought to reduce their outstanding contracts. The gross market value of the outstanding CDSs is a better yardstick for measuring the market risk. It rose substantially over the whole period to reach 3.2 trillion US dollar in June 2008. It should further be noted that CDS single-name trading has dropped off in the last quarter of 2008.

CHART 1 CREDIT DEFAULT SWAPS



Source : BIS (survey data) ; DTCC for December 2008 (TIW data).

CDS protection sellers and buyers mainly include the banks with their trading and loan portfolio desks, investment funds, hedge funds and insurers. Insurers are mostly active as sellers of protection. The CDS dealing is quite concentrated in the CDS markets, that operate bilaterally. Nonetheless, electronic trading platforms have emerged but no single platform seems to become dominant.⁽¹⁾

1.3 Issues in CDS processing

As a fast-growing industry, CDS trading and post-trade processing have hit several problems that needed to be solved. The main issues can be related to the lack of standardisation of the CDSs and the lack of market transparency and liquidity.

Smooth trading and post-trade processing are greatly fostered by contract standardisation. Compared to other financial derivatives, such as foreign exchange or interest rate swaps, CDSs are more complex and less standardised. While the standardisation process of the CDS index products is well advanced, single-name CDSs still contain many bespoke elements. Among them is the lack of standardisation of coupon payment dates or of the list of eligible debt obligations deliverable in case of default of the reference entity. Likewise, the list of credit events included in CDS contracts is not always uniform, nor is the meaning of these terms identical in each contract.⁽²⁾ The standardisation of CDS contract specifications also minimises operational and settlement risk when processing them.

CDSs are traded over the counter; they are not an exchange-listed product. Information that enhances the market transparency for CDS trades, such as price and volume information, is both beneficial at trading and at post-trading level. Deep and transparent CDS markets enhance the price discovery process when concluding a trade. Reliable prices also enable counterparties to value and manage their CDS positions adequately after the trade is concluded.⁽³⁾

(1) See the "Over-the-counter derivatives", testimony by Patrick M. Parkinson of the Federal Reserve System before the US Senate on 9 July 2008. European traders use electronic trading platforms more than their US counterparts. The use of electronic trading can enhance the post-trade processes by achieving straight-through processing throughout the life cycle of the CDS.

(2) According to the ISDA Credit Derivatives Definitions, the main types of possible credit events related to the reference entity include bankruptcy; obligation default; failure to pay; repudiation/moratorium and debt restructuring. In April 2009, ISDA has introduced a new protocol, initially limited to the US, stipulating a uniform default procedure and standard coupons for CDSs.

(3) CDS market transparency has been enhanced over the last few years via the availability of market prices and volumes via Markit, a financial information services company providing credit derivative pricing data and valuation and trade-processing services. Since the end of 2008, the US Depository Trust and Clearing Corporation (DTCC) has been publishing aggregate data on CDS market turnover and on outstanding amounts for indices and single-name CDS.

Given the bilateral nature of a CDS contract and its long maturity, the creditworthiness of the counterparty to the CDS is a relevant element when concluding and pricing the CDS. If the counterparty to the contract defaults, the market value of the CDS, if positive, is at risk of being lost. A first way to get out of a CDS position is to transfer the originally concluded CDS contract via novation (or assignment), whereby one of the original counterparties to the CDS (the “seller”) is replaced by a third party. In that case, the CDS price, its positive or negative value, has to be paid to or received from the original counterparty to the CDS. The need to pay this fee upfront does not enhance the ability to “sell” the CDS smoothly. The secondary market for CDSs is thus not very liquid. Furthermore, trades transferred this way have not always been documented correctly. A second way of getting out of a CDS position is by entering an opposing new CDS trade. When this trade is concluded with a different party from the original one, both the original and the counterbalancing positions are kept on the books, and this triggers the need to cover these positions or reserve adequate capital for them.

Risks to be contained when processing CDSs can be distinguished between operational risks – including settlement risks – and counterparty risks on CDS positions. Operational risks became higher with the fast-growing CDS trade volumes. Counterparties were not always able to correctly and timely document the existence or the specifications of a CDS trade, or to adequately process its life-cycle events. Counterparty risk on CDSs became the focus of attention when it became apparent that even big market players could default on their obligations under a CDS trade. Subsequently, CDS position coverage became more costly and CDS counterparties sought to cover their exposure to CDS positions as adequately as possible.

Table 1 summarises various improvements that have been made to CDS post-trade processing in order to cope with CDS operational risks and counterparty risks, and with the lack of standardisation, market transparency and liquidity of CDSs. Initially, the improvements were mainly implemented bilaterally between CDS counterparties; these bilateral solutions will be reviewed in section 2. However, it has gradually become clear that a more centralised market infrastructure is required. Section 3 will examine the market infrastructures, other than CCP, which have recently developed, e.g. under the form of datawarehouse or prime brokerage, while section 4 will look at the contribution of CCP clearing.

TABLE 1 ENHANCEMENTS IN CDS POST-TRADE PROCESSING

| | Operational risk management | Counterparty risk management |
|-----------------------------------|--------------------------------------|------------------------------|
| Bilaterally implemented solutions | Trade confirmation and novation | Portfolio reconciliation |
| | Netting of premium payments | Collateralisation |
| | Cash settlement of CDS default event | |
| Market infrastructure approach | Datawarehouse | Prime brokerage |
| | CLS settlement | Portfolio compression |
| Central counterparty (CCP) | | |

2. Bilateral CDS clearing, settlement and life-cycle servicing

At the bilateral level, management of both the credit default swap’s post-trade operational risk and counterparty risk has been enhanced in several ways.

2.1 Operational risk management

Regarding operational risk, the safety and efficiency of the post-trade processing of CDSs has benefited from contract modifications related to the confirmation of trades and to the netting of CDS payment flows. Furthermore, shifting from a physical settlement to a cash settlement, in the case of a default of the CDS reference entity, has made it possible to avoid market distortions in the underlying bond market.

2.1.1 Confirmation and novation of trades

A first range of modifications concerns the confirmation and novation of trade. The delay in confirmation of concluded CDSs between the counterparties to a trade has indeed been a serious problem in the growing CDS market. In the absence of confirmation, the validity of the contract or its modalities might be disputed. The NY Fed and other prudential supervisors had to intervene in 2005 to ensure that at least the most important market participants got rid of the backlog of non-confirmed CDS trades. Further improvements became possible thanks to the use of dedicated services for confirming CDS trades. In 2003, SwapsWire (now MarkitWire, a Markit service) started to offer electronic services for the confirmation of standardised OTC credit derivatives trades, including CDS

assignments and prime-brokerage-transfers (see hereafter). It became a de facto market standard together with DTCC's Deriv/SERV.⁽¹⁾

One specific documentation problem concerns the transfer of a CDS in a secondary market trade, i.e. the novation or the assignment of the trade. Previously, when a counterparty to a CDS transferred its contract claims and obligations to a third party, it frequently did so without notifying this to the original counterparty. This omission raised questions about the legality of the contract transfer and thus made the monitoring of the CDS position unreliable for the three parties involved. ISDA finally solved the issue by requiring a contract transfer to have the prior approval of the original counterpart or being null and void.

2.1.2 Contract standardisation and netting of payment flows

Specific standardisation of the CDS contract design has made it possible to enhance the operational efficiency of payment processing over the life cycle of the contract. Cash payments of CDS coupons are now standardly due on fixed dates four times a year, enabling netting of the cash flows involved. Although these payments are relatively low-volume amounts, this adaptation is important. Before its implementation, around 10 p.c. of the flows were not paid on time due to the complexity of processing payments on contracts with non-fixed coupon dates. However, CDS trades that were concluded before this modification usually still have non-fixed coupon dates, i.e. they remain serviced on a rolling settlement basis.

Further payment netting can occur as the ISDA master agreement provides for parties to opt for net payments on all the trades entered into under it, including on trades other than CDSs if this is specified. This allows the parties to a master agreement to aggregate the amounts owed by each of them under all of the transactions outstanding under that master agreement and to replace them with a single net cash amount, if payable on the same day and in the same currency.

2.1.3 Cash settlement of CDS default event

Before 2007, the physical settlement procedure for coping with the default of the reference entity did cause some market distortions. For single-name CDSs, it was not actually possible to settle in cash. Under a physical settlement, the protection seller had to pay the buyer par value, and in return received an eligible debt obligation of the reference entity. For many companies, there is a larger outstanding notional value of CDS contracts than the outstanding notional value of their debt obligations.⁽²⁾ As

a consequence, the debt of an entity that had defaulted was so highly sought after for delivery under the CDS credit event that – paradoxically – this bond became more expensive. ISDA has worked out an auction mechanism to facilitate settlement of a large number of contracts at a fixed cash settlement price. Under a cash settlement arrangement, the protection seller pays the buyer the difference between par value and the market price of a debt obligation of the reference entity, as determined via the auction. ISDA contract specifications now also make it possible for counterparts to avoid as far as possible every physical settlement under a CDS.

2.2 Counterparty risk management

Bilateral CDS counterparty risk management has clearly evolved. Tools for monitoring CDS positions have been enhanced by using dedicated portfolio reconciliation services. Also, counterparty risk coverage via collateral has increasingly become standard practice.

2.2.1 Portfolio reconciliation services

Without the intervention of a CCP, credit default swap counterparties have to manage the risk of a counterparty default themselves. In the event of insolvency of a counterparty, the contracts will have to be terminated and closed out on a bilateral basis, and ensuing open positions will have to be hedged. A first requirement for managing this counterparty default risk is for the CDS trades and positions to be known. However, it has transpired that CDS trades were not always registered correctly. To alleviate this problem, portfolio reconciliation services were, for instance, developed by Markit and TriOptima⁽³⁾ in order to regularly check the correspondence of the CDS trades and positions among the counterparties involved.

2.2.2 Collateralisation

OTC derivatives trading has become more and more a collateral-driven activity. The ISDA 2008 Margin Survey⁽⁴⁾ confirms that collateral coverage is growing, both in terms of trade volume subject to collateral agreements and of credit exposure covered by collateral. For credit

(1) In July 2008, Markit and DTCC announced the formation of a new company to join their forces in post-trade confirmation and matching services for OTC derivatives.

(2) For example, at the time it filed for bankruptcy on 14 September 2008, Lehman Brothers had approximately 155 billion US dollar of outstanding debt but around 400 billion notional value of CDS contracts which referenced this debt were also outstanding.

(3) TriOptima is a Swedish financial technology company, and is a provider of portfolio reconciliation and compression services for CDSs and interest rate swaps.

(4) See www.isda.org. The 2008 survey refers to the respondents' collateral management practices as of 31 December 2007.

derivatives, 66 percent of the exposure was collateralised at the end of 2007, compared with 25 percent in 2003. Over the various categories, cash collateral continues to grow in importance among most reporting firms, and now stands at over 78 percent of collateral received and 83 percent of collateral delivered. This increase in cash is balanced by a decline in the use of government securities.

2.3 Benefits and drawbacks of bilaterally implemented risk management solutions

The above-mentioned bilaterally implemented solutions significantly enhance the market's ability to manage operational and counterparty risk in CDS trades and positions. However, due to the fast-growing CDS trade volumes, there was a clear need to increase the processing capacity via a further standardisation and automation. Market infrastructure solutions that enable their users to benefit from increased economies of scale and that reduce operational risk were a logical next step. Furthermore, with the collateralisation of CDS positions, the cost of holding these positions rose, so there were clearly additional benefits to be realised via CDS position netting.

3. Market infrastructures for CDS processing

Under market and regulatory pressure, third-party providers have started to offer infrastructure solutions as a more powerful tool for coping with operational and counterparty risk in CDSs.

3.1 Operational risk management

A significant step forward was taken when DTCC started to provide a service for keeping a central record of all CDS trades. This clearly enhanced the efficiency of CDS processing. Subsequently, life-cycle payments of CDSs held with DTCC started to be settled via the Continuous Linked Settlement (CLS) Bank⁽¹⁾, thus making it possible to avoid settlement risk on these payments.

3.1.1 Datawarehouse

Manual processing and non-standardised procedures do increase operational risk. Since 2005, the US-based DTCC has offered a so-called trade information warehouse service for CDSs, implying that it keeps a central record of all bilaterally concluded (standardised) CDSs.⁽²⁾ It also keeps a record of any contract change, including its assignment. This enables the contracting parties to centrally and easily

verify the existence and the terms of the contracts. It further improves post-trade processing of the contracts. Based on the available information in the warehouse, full life-cycle servicing of the contracts can be carried out, including valuations, life-cycle payments calculations, netting, margining and settlement, and default events handling. DTCC's datawarehouse plays a central and significant role in this.⁽³⁾ However, it is not necessary nor always desirable that the DTCC provides all of these services, as other service providers may be in a better position to do so. Recognising that the database has the character of a utility implies that it is important that other providers can freely access the data in the warehouse, and on a level playing field basis.

3.1.2 CDS cash settlements

Payments of CDS coupons and - when due in cash - the margin payments on a CDS, can pass through the relevant payments system such as TARGET2 for euro-denominated CDSs or can be settled in the books of a commercial bank. Since the end of 2007, cash payments related to CDSs and held in the DTCC warehouse have been netted by DTCC and subsequently settled through CLS Bank, a US-based dedicated post-trade infrastructure that mainly settles foreign exchange trades between its participants.⁽⁴⁾

3.2 Counterparty risk management

Counterparty risk management techniques include the use of prime brokerage services for CDS trades. A prime broker can be considered here as a semi-market infrastructure that intervenes as counterparty between selected trades of its clients. A further and specific infrastructure-based service for the counterparty risk management of CDS positions consists of portfolio compression.

3.2.1 Prime brokerage

A small number of market participants offer prime-brokerage services for CDSs. This implies that the prime broker becomes a counterparty to the trade after its conclusion, by intervening between its client and the third

(1) CLS Bank is an initiative undertaken by the international banking industry in 2002 to reduce and manage the risks associated with the settlement of foreign exchange transactions.

(2) The record of the CDS contract held by DTCC is called the "golden copy".

(3) According to an estimate by the US SEC, the DTCC database comprises 80 p.c. of outstanding CDS trades. See the "Testimony concerning credit default swaps" by E. Sirri of the Securities and Exchange Commission before the USA House Committee on Agriculture on 15 October 2008.

(4) CLS Bank predominantly settles trades to be settled on a payment-versus-payment basis so as to manage the settlement risk involved in such trades. It should be noted that the payments related to a CDS do not have a payment-versus-payment character, so that the strict limits set by the Eurosystem in its 19 July 2007 policy statement apply to the use of CLS Bank for settling CDS coupon payments denominated in euro.

party with whom the client concluded the CDS. The client can only transfer, i.e. give up, trades with selected third parties accepted by the prime broker. By delivering this clearing service, the prime broker acts as a kind of mini-central counterparty. The client centralises all its trades with one counterparty – its prime broker – so that it can subsequently net and set off its positions bilaterally with the prime broker and benefit from the ensuing diminishing collateral requirements, for instance. Prime-brokerage activities are relatively new for the OTC credit derivatives markets. The business is highly concentrated with only 25 major players worldwide providing this service. Big financial institutions tend to use more than one prime broker as this enables them to conceal their overall positions and to spread the counterparty risk they have on the prime broker. Hedge funds, on the contrary, frequently concentrate their trades on one prime broker. As prime brokers can be considered as quasi-market infrastructures, it is important that their risk management complies with the relevant standards.

3.2.2 Portfolio compression services

Besides portfolio reconciliation services (see section 2.2.1), portfolio compression services have also been developed. This specific service is delivered by TriOptima for example. This netting service for CDSs is carried out on a multilateral basis whereby the participant accepts that the participants/counterparties to the CDS trades are substitutable. It implies that outstanding CDS contracts are terminated early and replaced by a smaller number of such contracts. The substituting contracts are legally binding for the participant using the service. These contracts represent the same net risk position for the participant using the service, although not necessarily vis-à-vis the same (number of) counterparties. Portfolio compression aims to set off CDS contracts immediately wherever possible. As a consequence, a smaller number of outstanding CDSs on the participant's books makes their life-cycle servicing more efficient.⁽¹⁾ Also, the outstanding counterparty risk among the participants declines whereby a diminished position in CDSs reduces the capital and/or margining requirements. After substitution, the counterparty risk is still outstanding on several CDS counterparties; in other words, the CDS's counterparty risk is not standardised.

3.3 Benefits and potential enhancements of the considered infrastructure solutions

Keeping CDS trade records centrally in a datawarehouse enables market participants to benefit from economies of scale. It further allows other market infrastructure providers – such as those offering payment services for CDS – to

service CDS processing efficiently. Also, prime brokerage and portfolio compression services enable their users to set off CDS contracts and thus save collateral costs while maintaining the same net position. However, the first solution concentrates the counterparty risk on the prime broker, while the counterparty risk also remains present in the second solution. Both a further reduction and a standardisation of counterparty risk on CDS positions can be obtained by using CCP services.

4. CCP as a solution for managing post trade risk in CDS trades

This chapter first reviews the benefits of a CCP. The public sector policy stance regarding a CCP for CDSs is then looked at. Finally, some selected determinants for the design of the CCP solution are highlighted.

4.1 Post-trade risk management via a CCP

In the value chain of a trade in a financial instrument, the central counterparty intervenes at the clearing level, where the counterparties calculate and set the reciprocal obligations to pay or to deliver. The clearing of a trade follows the trading step where the counterparties to a trade conclude the deal and it precedes the settlement of the trade involving the actual payment or delivery related to the transaction. A CCP can be defined as an entity that intervenes between counterparties to contracts traded in one or more financial markets, becoming the buyer to every seller and the seller to every buyer. The CCP can thus also net the contracts in an efficient way.

Clearing members will not use a CCP if the overall risk monitoring and managing benefits are no greater than in cases where a CCP does not intervene. A CCP has an information advantage to gain some insight into the outstanding risk as the CCP centrally follows up the risk positions and profile of all clearing members. More specifically, a CCP enhances the management of both the operational and counterparty risk for the contracts it clears.

At the operational level, a CCP enables contracts to be serviced on a net basis. As fewer contracts are outstanding, the life-cycle servicing on them, such as payments of coupons, becomes operationally less demanding. Also the CCP can efficiently collect margins and execute payments

(1) TriOptima estimates that the true risks on CDS positions are limited to 25 p.c. of the portfolio as the other 75 p.c. of the positions are offsetting trades. During 2008, TriOptima tore up trades amounting to 14 trillion.

over the credit default swap's life-cycle and in the case of a credit event. Moreover, the multilateral processing of payments is, in the absence of a CCP, usually enhanced via a payment netting scheme whereby the settlement risk run on these payments is contained by a guarantee mechanism. By intervening, a CCP can provide such a guarantee.

By its interposition, a CCP reduces and standardises counterparty risk via position or contract netting. Contract netting can be defined as the setting-off of mutual obligations determined by a standardised contract. Counterparties thus take the mutual obligations off their books before the intended end date of the contract. The remaining obligation after set-off can be replaced by a new contract. Contractual netting can take place bilaterally, in a ringing arrangement or in a CCP scheme with each of these successive schemes enhancing the risk-mitigating benefits for its participants.

Under bilateral contractual netting, counterparties remain exposed to the financial soundness of their counterparties, which can of course have differing credit risk profiles. Under a ringing arrangement, counterparties belonging to the ring agree that they will accept each other as substitutes for the original counterparties to the trade.⁽¹⁾ This implies that not only the specific terms of a given contract are standardised so that it can be set off but that also the counterparty risk on this contract becomes fungible. While a ringing arrangement enables more contracts to be set off than under a bilateral contractual netting arrangement, the (substituted) individual counterparties remain responsible towards each other. A CCP scheme makes it possible to efficiently net obligations multilaterally, via a bilateral set-off of the contracts between the intervening CCP and each clearing member. Also, all clearing members now have a direct risk on the CCP only.

4.2 Public sector stance on a CCP solution

Authorities are traditionally concerned with the risk that participants may fail in chain. The deteriorating creditworthiness of one participant may impact on the creditworthiness of other market players. This concern is greater in cases where the clearing of the OTC products takes place bilaterally, as this brings higher uncertainty as to what impact the default of one participant will have on the others. The establishment of a CCP for CDSs would help to solve the domino problem provided the CCP's risk is managed in a robust way. Authorities worldwide are now backing a CCP solution, and this on a short time horizon.⁽²⁾

As a CCP concentrates risk, it is important that it complies with relevant standards. In this respect, the November 2004 CPSS-IOSCO Recommendations for CCPs also apply to CCPs clearing CSDs (see Box 1).⁽³⁾ A CCP must be a single purpose entity to clear the contracts of its clearing members and its overall position in the cleared trades must be zero in the absence of clearing member defaults. Further core elements of CCP risk management include its membership criteria, its financial resources – including the clearing fund that mutualises the risks –, and the specific rules drawn up to cope with the default of a CCP member. From a systemic risk point of view perhaps the most relevant CPSS-IOSCO requirement, states that any CCP should be able to cope with the default of the participant having the biggest risk position with it and to do so under extreme market conditions. The CCP can use a general or a dedicated default fund only for CDSs for that purpose. This latest model may put a kind of firewall between the markets cleared by a CCP.⁽⁴⁾

A specific concern of the authorities is the location of the post-trade market infrastructure. A CCP scheme could in principle offer a solution for CDSs irrespective of the location of the reference entity of the CDS and irrespective of the currency in which the CDS is denominated. While this approach avoids the need of having multiple CCP memberships for CDS clearing, European authorities have expressed concern about the market being centralised in a single CCP infrastructure. When, in mid 2008, the US Federal Reserve backed a US-based global CCP solution for CDSs, European authorities called shortly afterwards for a European dimension of the solution, referring to competition and supervision concerns. The EU's Ecofin Council called in December 2008 for the urgent creation of one or more European CCP clearing facilities for credit derivatives. The European Commission clarified that at least one CCP for credit derivatives should be based in Europe, subject to European supervision and regulation, and compliant with European monetary policy objectives.

- (1) On the evolution and use of ringing in futures markets, see J.T. Moser, "Contracting innovations and the evolution of clearing and settlement methods at futures exchanges", August 1998, Federal Reserve Bank of Chicago.
- (2) In April 2008, the Financial Stability Forum called for prompt action by the industry to develop a longer term plan for a reliable operational infrastructure supporting OTC derivatives (see the FSF report on enhancing market and institutional resilience at www.bis.org). Also, the European Parliament is discussing a proposal to relax capital adequacy requirements in cases where CDS trades are cleared by a CCP.
- (3) For the European Union, these standards are being enhanced by the ESCB-CESR working group. On 31 March 2009, the ESCB and CESR issued a consultation on draft recommendations for CCPs as amended for OTC derivatives.
- (4) Specific default rules for CDS central clearing might further be inspired by LCH. Clearnet Ltd's Swapclear default rules for clearing interest rate swaps. Under these rules, a specific loss-sharing arrangement is imposed on the surviving clearing members, whereby the contracts of the defaulter that were accepted at their conclusion by the CCP within its risk management framework – including the CCPs' contract position limits – are sold and transferred to the survivors. Besides this, the surviving SwapClear members have a specific role in managing the defaulter's interest rate swaps portfolios.

Box 1 – CPSS-IOSCO Recommendations for central counterparties

1. Legal risk

A CCP should have a well founded, transparent and enforceable legal framework for each aspect of its activities in all relevant jurisdictions.

2. Participation requirements

A CCP should require participants to have sufficient financial resources and robust operational capacity to meet obligations arising from participation in the CCP. A CCP should have procedures in place to monitor that participation requirements are met on an ongoing basis. A CCP's participation requirements should be objective, publicly disclosed, and permit fair and open access.

3. Measurement and management of credit exposures

A CCP should measure its credit exposures to its participants at least once a day. Through margin requirements, other risk control mechanisms or a combination of both, a CCP should limit its exposures to potential losses from defaults by its participants in normal market conditions so that the operations of the CCP would not be disrupted and non-defaulting participants would not be exposed to losses that they cannot anticipate or control.

4. Margin requirements

If a CCP relies on margin requirements to limit its credit exposures to participants, those requirements should be sufficient to cover potential exposures in normal market conditions. The models and parameters used in setting margin requirements should be risk-based and reviewed regularly.

5. Financial resources

A CCP should maintain sufficient financial resources to withstand, at a minimum, a default by the participant to which it has the largest exposure in extreme but plausible market conditions.

6. Default procedures

A CCP's default procedures should be clearly stated, and they should ensure that the CCP can take timely action to contain losses and liquidity pressures and to continue meeting its obligations. Key aspects of the default procedures should be publicly available.

7. Custody and investment risks

A CCP should hold assets in a manner whereby risk of loss or of delay in its access to them is minimised. Assets invested by a CCP should be held in instruments with minimal credit, market and liquidity risks.



8. Operational risk

A CCP should identify sources of operational risk and minimise them through the development of appropriate systems, controls and procedures. Systems should be reliable and secure, and have adequate, scalable capacity. Business continuity plans should allow for timely recovery of operations and fulfilment of a CCP's obligations.

9. Money settlements

A CCP should employ money settlement arrangements that eliminate or strictly limit its settlement bank risks, that is, its credit and liquidity risks from the use of banks to effect money settlements with its participants. Funds transfers to a CCP should be final when effected.

10. Physical deliveries

A CCP should clearly state its obligations with respect to physical deliveries. The risks from these obligations should be identified and managed.

11. Risks in links between CCPs

CCPs that establish links either cross-border or domestically to clear trades should evaluate the potential sources of risks that can arise, and ensure that the risks are managed prudently on an ongoing basis. There should be a framework for cooperation and coordination between the relevant regulators and overseers.

12. Efficiency

While maintaining safe and secure operations, CCPs should be cost-effective in meeting the requirements of participants.

13. Governance

Governance arrangements for a CCP should be clear and transparent to fulfil public interest requirements and to support the objectives of owners and participants. In particular, they should promote the effectiveness of a CCP's risk management procedures.

14. Transparency

A CCP should provide market participants with sufficient information for them to identify and evaluate accurately the risks and costs associated with using its services.

15. Regulation and oversight

A CCP should be subject to transparent and effective regulation and oversight. In both a domestic and an international context, central banks and securities regulators should cooperate with each other and with other relevant authorities.

The Commission further stated that it could eventually take regulatory action in this regard. In December 2008, the ECB Governing Council came out in favour of having at least one European CCP for CDS located within the

euro area. These policy stances will undoubtedly influence the outcome of the competition between the five main existing industry initiatives to develop a CCP for CDS (see Box 2).

Box 2 – Industry initiatives to develop a CCP for CDS

Market participants now consider the containment of CDS counterparty risk via a CCP to be a preferable solution. This view is reflected for instance in the report entitled “Containing Systemic Risk: The Road to Reform” published on 6 August 2008 by the Counterparty Risk Management Policy Group, a private-sector group consisting of the main OTC derivatives dealers.

There are currently five main industry initiatives promoting a CCP for CDS:

- The first initiative was launched by The Clearing Corporation (TCC), a derivatives dealers’ consortium that issued a proposal for establishing a CCP for CDS in April 2008. The consortium groups together the main stakeholders in the single-name CDS markets. The US-based Intercontinental Exchange (ICE), an operator of OTC derivatives markets, has meanwhile taken a stake in the project. ICE/TCC effectively started clearing CDS trades in March.
- Subsequently, the US-based Chicago Mercantile Exchange (CME), in cooperation with the trading platform of CDMX, a joint venture between CME and Citadel Investment Group, an alternative investment and technology firm, also proposed a CCP solution.
- Liffe, the UK derivatives exchange of NYSE Euronext, together with the London-based CCP LCH.Clearnet Ltd launched a clearing service for a selection of iTraxx CDS indices in December 2008. The Liffe BClear platform operates as a matching engine for these trades that will subsequently be cleared by LCH.Clearnet Ltd. The service has not been used to date.
- LCH.Clearnet group announced in a second step, in mid February, that its Paris-based CCP LCH.Clearnet SA will also provide CDS clearing services.
- Finally, the German Eurex derivatives exchange and Eurex Clearing AG, its CCP subsidiary, announced in October 2008 that they will be providing a global solution for trading and clearing CDS.

4.3 Determinants of the CCP design

Some key elements related to CDS clearing will be particularly relevant in shaping the final CCP solution and possibly the overall post-trade CDS market infrastructure. They include the contracts that will be accepted as eligible for clearing, the accepted clearing members, and, finally, the role of the datawarehouse.

4.3.1 Categories of contracts eligible to the CCP

All (future) CDS clearing providers envisage accepting trades in index products and are at least considering accepting single-name CDSs. Contracts can only be offered for CCP clearing when standardised, but single-name CDSs still contain a lot of bespoke elements. Standardisation is a prerequisite to setting off and also valuing contracts efficiently. The possibility to adequately value a cleared contract is a key element of

a CCP’s risk management. This is particularly an issue when pricing “off-the-run” trades, i.e. those CDSs with remaining maturities that are no longer liquid. In general, the pricing models to value CDSs are complex and involve model risk. This is especially so as default events of the reference entity might occur suddenly. For this reason, it is argued that the clearing of single-name CDS trades will require agreement of further market conventions for the purpose of trade valuation.⁽¹⁾ Some are even of the opinion that single-name CDSs cannot be centrally cleared as the margining or default fund requirements to cope with potential default events could prove to be prohibitive.

(1) See the report on “Containing Systemic Risk: The Road to Reform” published by the Counterparty Risk Management Policy Group.

4.3.2 CCP governance and membership criteria

The CCP ownership structure can make a difference when selecting the post-trade infrastructure. All four CCPs offer a “preferred” trading platform for the CDSs they will clear but will certainly also clear OTC trades. CDSs are of course still an OTC product and the market concentration implies that any proposal relies heavily on the decision of the main dealers in the market as to which infrastructure they will use at trading and clearing level. Banks that have to decide to use a CCP might face a trade-off between, on the one hand, savings due to risk reduction and increased efficiency of the CCP solution and, on the other hand, the loss of client fees when CDS-related services are replaced by CCP clearing. CCP ownership and expected shareholder proceeds might be a trigger for the main dealers to join.

Furthermore, CCP governance can influence its membership criteria. CCP participants should be both financially sound and operationally capable. While specific risk-based criteria are relevant for participants that clear CDSs, these criteria could function as access criteria that are no longer risk-based and that unnecessarily restrict CCP membership for CDS clearing, thus reducing the CCP’s overall impact in managing CDS operational and counterparty risk. A consequence of this might be that (too) many CDS positions are cleared and risk-managed outside the CCP arrangement, in a second tier. In the market, there seems to be an ongoing debate on just how restricted the CCP member access criteria for CDS clearing should be.

4.3.3 Role of the datawarehouse for CCP clearing of CDSs

All service providers will offer the opportunity to migrate existing bilateral OTC contracts to the CCP, turning them into centrally-cleared contracts. To this end, all providers strive for connectivity to the DTCC datawarehouse that contains most existing CDS contracts.⁽¹⁾

It is further possible that the trades cleared by the CCP – i.e. for which the CCP has become a counterparty – will be held in the datawarehouse, where the two new contract legs with the CCP will then be registered. This is not necessary, however, as a CCP generally holds the claims and obligations of the contracts it clears in its own books. Most proposed CDS central clearing models nevertheless suggest that the CCP (also) holds the CDS contract to which it became a counterparty with the datawarehouse. A possible advantage of this is that all derivatives trades are held in the same central location. Depending on the model for CCP clearing used, a task distribution becomes possible whereby the CCP intervenes and

manages the counterparty risk on the CDS trade, while it uses DTCC’s or third party’s services, such as the netting of the CDS coupon cash payments or even the set-off of contracts via compression. Compared to existing CCP models, this implies an outsourcing of CCP functions, at least to some extent.

Conclusion

Over the last few years, market participants and supervisory authorities alike have devoted a lot of attention to the post-trade processing of CDSs. Initial improvements in this respect have been implemented thanks to private-sector initiatives, sometimes helped by supervisory pressure. These initiatives have led to progress in product standardisation and to the automation of post trade processing via dedicated market infrastructures, which in turn have significantly reduced operational risk in the post-trade processing of CDSs. They have included the elaboration of dedicated and commonly-used matching systems and the use of a datawarehouse where CDS trades are stocked centrally. The datawarehouse forms the basis for third-party service providers to deliver further services for CDSs, such as valuation, netting, payment and collateralisation services.

CDS trading is an over-the-counter activity and, until recently, the dominant market participants have seen no need to manage the counterparty risk they incur on a CDS via the interposition of a CCP. However, some market participants already used prime brokerage services for CDS clearing, whereby the prime broker acts as a kind of mini-CCP between its clients and their dealers. Subsequently, with the credit crisis counterparty risk management becoming a dominant concern, the option of clearing CDS trades in a CCP has become more attractive. The use of a CCP can be seen as a logical follow-on from the use of portfolio compression services for CDSs where contracts are netted in ringing arrangements. In these rings, counterparties accept each other’s substitutability in the contracts to maximise the set-off results over their outstanding contracts. By adopting a CCP solution, counterparties to a CDS will not only set off their contracts but also centralise and standardise the counterparty risk they incur because all claims and obligations will be on the CCP.

For the authorities and the private sector alike, a CCP has the potential to enhance post-trade processing and to reduce the systemic risk because it can act as a central

(1) At this stage, DTC is the sole provider of datawarehouse services for OTC derivative contracts.

risk management entity. To have adequate and robust risk management practices that comply with the relevant standards is a prerequisite for any CCP. The points of attention for the risk management of CDS central clearing concern the ability to value the cleared contracts, the level of the CCP's financial resources and the adequacy of its dedicated rules in case of a participant default. An additional public sector concern relates to the stimulation of competition among CCPs and to the location of the CCP, which has a bearing on its regulatory and supervisory environment. Depending on market participants' choices, global or regional solutions will emerge. Today, several initiatives for a CCP for credit default swaps are up and running or are planned to be implemented during the course of this year.

How the CCP model for CDSs will look depends, among other things, on the extent to which not only indices but also single-name CDSs are cleared, on how CCP membership criteria are set, and on the role of the datawarehouse. Most market participants are of the opinion that both single-name and index CDSs can be sufficiently standardised to become products that can be centrally cleared in a CCP. However, a CCP solution by itself might not enhance the liquidity of all CDSs and thus the ability to value them properly. Also, other categories of credit derivatives such as collateralised debt obligations, remain outside the scope of a CCP clearing solution. Furthermore, the extent of the restrictions on CCP membership for CDS clearing will impact on the share of overall CDS trades cleared via the CCP. Finally, a pivotal role for the datawarehouse in keeping the CDS contract records implies that some standard CCP functions such as netting arrangements can now be outsourced to other infrastructure service providers.

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Thematic Articles

Extreme events and financial system governance: some lessons from the crisis

Joachim Keller
Peter Praet

Introduction

The consequences of the current financial and economic crisis can clearly be described as catastrophic. In the wake of losses on risky subprime loans and related structured finance products, several financial institutions and with them the entire financial system came close to collapse and could only be saved by concerted emergency measures by governments across the world. However, the overall costs of the crisis are huge: most financial institutions have incurred massive losses and shed jobs in large numbers. Most economies around the world have slipped into recession or their growth has slowed down drastically. The rescue measures and aid packages that were necessary to prevent the banking system from collapsing will impose a large burden on governments' budgets and ultimately on taxpayers.

The catastrophic consequences of the current crisis have put tremendous pressure on financial policymakers to take measures to minimise the likelihood of such crises in the future. In this context, it is important to understand more about the nature of crises, or extreme events as they are referred to in risk managers' parlance, in the financial system. Like other catastrophic events (such as natural disasters), an extreme event in the financial system can be described as an "event producing a subversion of the order or system of things; a final event, usually of a calamitous or disastrous nature".⁽¹⁾ It is worth highlighting three more specific characteristics of extreme events in the financial system. First, the way they propagate through the financial system depends on the interdependencies between

and behavior of financial institutions. They also often arise endogenously from within the system. Second, the probability of such events is extremely low. That is, the financial system is able to absorb many different imbalances and shocks, but very occasionally a shock or imbalance is too large for the system to absorb and the consequences can be catastrophic. The extremely low probability also implies that there is no market price for the risk of extreme events. Third, the overall costs of extreme events can be very high and tend to extend beyond those segments from which they originated.

Bearing all this in mind, what has gone wrong in the financial system? This article assesses two main factors that may explain how this crisis could have happened. The first focuses on the weaknesses of risk models and the difficulty to capture the systemic complexities and interdependencies within the financial system. In other words, it is hard to measure the probability of extreme events and how they play out because they arise endogenously and occur only very infrequently. The second factor relates to the incentive of financial institutions to ensure their resilience to extreme events. Indeed, due to the extremely low probability of such events and the low individual costs relative to the total costs of a crisis, financial institutions have individually little incentive to ensure that they are collectively robust.⁽²⁾ In other words, they do not "internalise"

(1) Collaborative International Dictionary of English (CIDE).

(2) This article refers to "investment in robustness" when describing the efforts of financial institutions to limit risk-taking and to reduce their vulnerability to adverse market conditions. Such efforts might include not relying blindly on simplistic models but making decisions based on a deeper and critical risk analysis (using "own judgement"). Throughout the article, the expressions "under-investment in robustness" and "excessive risk-taking" are used synonymously.

the external costs, or negative externality, they impose on the system in case of failure.

The analysis of the causes of the crisis will also be useful in discussion of the appropriate regulation of the financial system. In order to minimise both the risk of individual failure and the risk of events of a catastrophic dimension, the goal of regulation must be (either by improving incentives or setting rules) to ensure that financial institutions invest sufficiently in their robustness and to facilitate a proper appreciation of systemic risk through adequate modelling.

This article is structured as follows. Section 1 focuses on the weaknesses of risk management models and highlights some systemic properties of the financial systems that have hitherto not been sufficiently addressed. Section 2 discusses the question of whether financial institutions have sufficient incentives to invest in robustness and to protect themselves against catastrophic events. Section 3 provides some examples of policy proposals that aim at reducing the risk of extreme events in the financial system. Section 4 concludes.

1. Modelling risk of extreme events

Many commentators blamed risk models for playing a major role in the crisis. Risk models are supposed to help provide financial institutions' decision-makers with an accurate picture of the risk they face and to guide them in making risk-relevant decisions. However, risk models have failed in this crisis; they did not prevent institutions from accumulating excessive risk and did not seem to detect the large amount of 'hidden risk' that loomed in the financial system before the outbreak of the crisis.

Criticisms of risk models mainly fall into two categories: First, the models are vulnerable to "model risk", as their output depends crucially on a series of statistical assumptions. Second, they do not take into account the fact that risks in the financial system are partly endogenous. In other words, models were rather suited to assess the short-term risk of a given financial institution under the assumption that fundamental system characteristics remain stable. Hence, they addressed micro-prudential concerns, which focus predominantly on the stability of individual institutions.

However, such an approach is not well suited to assessing systemic risk and the risk of catastrophic events in a financial system. A top-down approach should be added,

where the assessment and modelling of risk is derived from overall system properties. The next sub-section highlights the main shortcomings of the models in use. The following sub-section discusses some fundamental characteristics of the financial system and how they contrast with the current practices for dealing with systemic risk.

1.1 Examples of shortcomings of current risk models

With respect to estimating the probability of extreme events, the main shortcomings of the models have been the following:

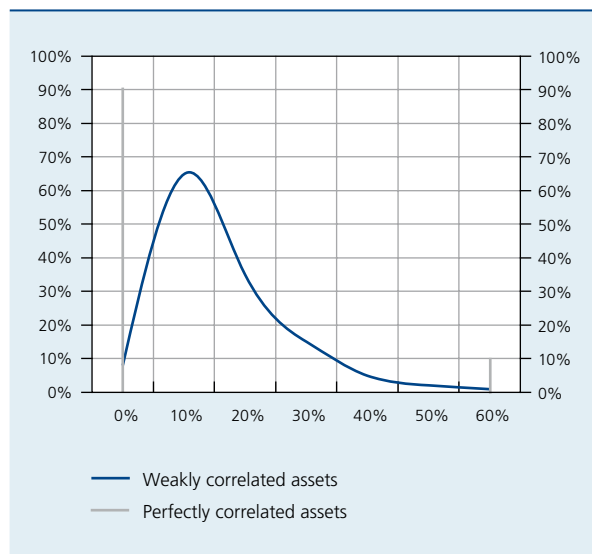
Excessively short-term horizon. Risk managers often fed the models with only relatively recent data. Since extreme events occur only very infrequently, such practices imply that relevant data from previous extreme events tended to be neglected ("short-term memory" or "disaster myopia" of risk models). This characteristic also makes risk models cyclical, since they become more lenient in boom times when recent data covers periods of low risk and default rates.

Arbitrary and inaccurate model assumptions. Risk modellers must make assumptions on statistical distribution to measure extreme events because they represent "tail risk". In theory, the appropriate statistical distributions should be selected according to the "fatness" of the tail. However, in practice, the fatness of the tail is rarely known and hence the choice of probability distribution is prone to errors. Often, risk managers use the standard normal distribution, although this distribution may produce a tail that is not fat enough. Indeed, some commentators argue that the systemic nature of extreme events in the financial system implies that tail risk is even higher than previously thought.⁽¹⁾ The choice of statistical distribution has a significant impact on measures such as VaR, leading to some degree of arbitrariness of the results (see Danielsson, 2008).

Invariant market structure. Another fundamental shortcoming of risk models is their implicit assumption that the underlying market structure and behaviour of actors is given and invariant over time. For instance, financial institutions insufficiently considered the likelihood of other institutions experiencing the same shocks and drawing similar conclusions, with a further impact on asset prices and liquidity. Similarly, widely used methods to estimate important inputs in risk models such as default or asset price correlations have relied on the assumptions of robust relationships over time. For instance, the measurement of default correlations by Gaussian copula functions relied

(1) FSA (2009); El-Erian (2008); Landau (2008), Haldane (2009), Acemoglu (2009).

CHART 1 THE EFFECT OF CORRELATION ON THE RISK PROFILE OF A CREDIT PORTFOLIO
(Probability distribution of portfolio losses)



on past data and therefore implicitly assumed that the correlations would remain stable. However, default correlation may vary over time and tend to increase significantly in times of stress.

Figure 1 illustrates the impact of correlation on a loss distribution. It depicts the loss distribution of a fictitious credit portfolio (credits with default probability of 10% and recovery rate of 40%) with two scenarios of differing correlations of default probability. In the case of low correlation, the portfolio owner faces relatively small portfolio losses most of the time, but the probability of either zero or very high portfolio losses is relatively low. In the case of perfectly correlated default probabilities, the owner faces either zero losses (probability of 90%) or a loss of 60% of the portfolio in case of default (probability of 10%). Thus, the owner faces very low or very high losses with a relatively high probability. Hence, an incorrect assumption of the correlation may lead a risk manager to underestimate the magnitude of loss in the case of a severe shock. In other words, a portfolio of highly-correlated assets is more vulnerable to extreme events. Hence, correctly estimating correlation is crucial for risk managers. Prior to the present crisis, risk managers dramatically underestimated the default correlations of certain structured finance assets and therefore took on much more systematic risk than anticipated.

1.2 Financial systems as complex adaptive systems

In order to improve modelling of systemic risk and extreme events, it is necessary to understand better how a financial system behaves and how it can be made more robust. This requires focusing on the overall systemic behaviour rather than just on the behaviour of individual institutions. For this purpose, it may be useful to think about financial systems in the same way as biologists or engineers think about systems such as ecosystems or complex electricity networks.

Financial systems can be described as “complex adaptive” systems. That is, the system participants are interconnected in a complex way, follow their own objectives and adapt in an uncoordinated way to changes in the environment. A main feature of such systems is that they generate some specific, system-wide outcomes, which cannot be explained by the behaviour of individual institutions. Thus, the so-called “composition fallacy” applies (Landau, 2008). An important implication is that the risk of extreme events and how they play out cannot be appreciated by looking at individual institutions alone. A corollary is that robustness of the system emerges from the collective action by financial institutions and cannot be engineered (such as in simple systems (e.g. heating systems) where behaviour of components can be more completely controlled).⁽¹⁾

In the long run, a major driving force in the complexity and dynamic nature of the financial system is innovation, often following from strategies such as regulatory arbitrage by financial system participants. This implies that the financial system is constantly evolving, which makes it difficult for the institutions or banks themselves to obtain a reliable picture of the risk inherent in the system. For instance, the initial success of certain structured finance products led market participants to believe that the risk associated with these products was relatively low. Now, those involved have learned that their risk assessments were deeply flawed. Regulatory arbitrage also implies that regulatory measures may become obsolete and actually generate new risks.

In the short run, quick adaptations to changed market conditions also bear the potential for unexpected and hard-to-predict behaviour of the system. In fact, the short-term strategies used by financial institutions in an extreme event often tend to aggravate the stressed market conditions.

(1) Kambhu, Weidman and Krishnan (2007)

1.3 Some properties of financial systems as complex adaptive systems

This section discusses some key properties of financial system behaviour. Financial policy-makers ultimately need to find ways to take account of these properties, as in many cases, financial institutions cannot adequately deal with them alone. In other words, a systemic approach to regulation is needed.

Non-linear relationships. In the event of an extreme event, financial sector stakeholders may abruptly change their behaviour, which may result in a regime shift, or a “jump”, to a different equilibrium. This leads to sharp variations in asset prices, correlation between asset prices, and volatility. For instance, actors may learn in a crisis that their risk assessment was wrong and become extremely risk averse before they can update their assessments (flight to quality episodes).⁽¹⁾

Also implied by non-linear relationships are **multiple stable states** and **path dependence**, which play an important role. The former implies that after a shock, financial institutions may react in a way that locks them in a suboptimal market equilibrium from which they are unable to move to another equilibrium where they would collectively be better off. Path dependence implies that the recovery path will be a function of the particular

conditions leading to the shock; therefore, the system may look very different even after recovery.

Contagion. In financial systems, losses incurred at a single institution or in a certain segment can translate into a system-wide crisis by causing funding withdrawals and the evaporation of liquidity, ultimately leading to cascading losses due to asset fire sales. Thus, contagion means that shocks which initially hit only one or a few institutions can propagate through larger portions of the system through reinforcing feedback loops.

Synchrony. For several reasons, financial institutions may fall into step and make similar choices, akin to shoals of fish or flocking birds. In the build-up of a bubble, for instance, financial institutions often tend to rely on “the market” rather than on their own judgement, thereby inflating an asset price bubble even further. More profoundly, the fact that financial institutions use similar risk models may also contribute to synchronised behaviour, both in the build-up of a bubble and in a crisis, when the institutions discover simultaneously that the models are flawed. In addition, peer comparison and benchmarking as well as decision-making under uncertainty contributes to synchronic behaviour.

(1) See Caballero and Krishnamurthy (2008) and Rigotti and Shannon (2005).

Box 1 – The importance of liquidity: maturity mismatch, liquidity risk and financial contracting

All financial institutions that act as intermediaries between lenders and borrowers rely on some form of maturity transformation. Most notably, banks use withdrawable deposits or short-term funding from other banks to finance long-term investments. This maturity mismatch generates liquidity risk, because when lenders demand their money back, a financial institution may have to rely on functioning markets (e.g. the interbank market) to roll over their debt or to sell some long-term assets to other parties.

Individual decisions...

A given financial institution will typically make decisions with respect to the maturity mismatch and to the management of liquidity risk by relying on some sort of stable structure and relationships in the market place (although it will also generally make use of some stress scenarios). Typically, the institution would identify several isolated risk scenarios and take appropriate precautionary measures. For instance, the institution may consider the scenario where liquidity in the funding market dries up and conclude that it could solve the problem by selling assets. Thus, there is the implicit assumption that the funding market and market for the assets are not simultaneously hit.



...may imply a fragile overall system

Liquidity-related decisions by credit institutions, although rational and prudent at the individual level, may in aggregate lead to a fragile financial system. For instance, Hellwig (1995) has provided a theoretical example in which banks have only modest maturity mismatches, but the overall maturity mismatch of the financial system, as generated by the chain of financial institutions, represents systemic risk. Hence, individual institutions may fail to incorporate systemic risk into the choice of their maturity mismatch.

Likewise, the system-wide dimension of shocks is generally not sufficiently appreciated by financial institutions. Liquidity shocks tend to affect several institutions simultaneously and may have contagious effects. For instance, market rumours about the solvency of a bank may make it harder for this bank to re-finance itself and force it to sell off assets. However, market participants may worry that banks with a similar structure have the same problem and refuse to re-finance these banks as well. This creates a simultaneous sell-off of these banks' assets which tends to depress the market price (fire-sale asset prices), further aggravating the situation of the banks in question and other institutions that have similar assets. Hence, the liquidity problem of one bank spreads to other banks and ultimately becomes a solvency problem. Thus, from a systemic perspective, there is a concern that liquidity evaporates across several market segments with potentially catastrophic consequences (e.g. evaporation of liquidity in the interbank lending market). Financial institutions have generally considered liquidity risk only in an isolated manner and have failed to take into account the systemic dimension.

2. Limits to individual institutions' incentives to address systemic risk

Financial institutions impose an external cost on overall system stability when they go bankrupt and generate a severe market dislocation (e.g. by asset fire sales). In this respect, it is said that financial institutions will internalise such external costs only when they bear fully the systemic costs and take them into account when investing in robustness. In the case of full internalisation of external costs, the individual incentives of financial institutions would ensure that the system is (i.e. from a social viewpoint) robust enough. The relevant questions are thus to what extent financial institutions internalise external costs and what are the main determinants of the degree of internalisation.

At the outset, it is important to acknowledge that it is impossible to determine in isolation a financial institution's incentives to internalise the social costs of failure. Financial institutions, like any firm in any market, operate in a complex setting where the legal system, regulation and other governmental actions, customers and competitors all have an important impact on the degree to which external costs are internalised.

2.1 The internalisation of external costs at the firm level

Any firm that goes bankrupt will forego future profits and so should have incentives to invest in its survival. However, financial institutions may lack the incentives to sufficiently invest in robustness. Consider, for illustration, the case where there is only one bank serving an economy. When considering investment in robustness, the bank would undertake a cost-benefit analysis and relate the investment costs to the future profits it would forego when going bankrupt. However, the bank customers and wider society benefit from the banking service as well, and so would suffer from failure of the bank (this is the external cost of a bank failure). Ultimately, the degree to which the bank internalises these external costs depends on whether customers can "price in" the value they derive from ongoing bank services (demanding higher interest rates if the bank is less robust) and thereby can induce the bank to invest appropriately in robustness.⁽¹⁾

In a world with multiple banks and asymmetric information, considerations with respect to product differentiation, market positioning and reputation potentially have a powerful impact on financial institutions' incentives to invest in robustness. Such considerations broadly impact on the conditions under which parties are willing to deal with a given financial institution. They also tend to be effective in the long run and hence might provide

(1) See Kim et al (2005) for an example of how borrowers may discipline banks to avoid losses and thereby to increase their robustness.

incentives to financial institutions to ensure their resilience to very infrequent extreme events.

However, this may not always be true. Indeed, in a highly competitive environment, financial institutions may not be able to afford to invest sufficiently in robustness, if this increases their cost base and implies that they cannot take on some desired risk. Concerns about (short- /medium-term) performance may thus weigh more than the consideration related to the remote probability of failure.

In addition, the fact that EEs in financial markets hit many institutions at the same time may also reduce incentives to invest in robustness, because the damage to reputation is likely to be lower when peers suffer similar problems. This is in contrast to other industries, where contagion effects are more limited and catastrophic events tend to hit a particular firm, but not the whole industry (e.g. a pharmaceutical firm that markets a new drug which turns out to have deadly side effects does not trigger a chain effect on its competitors).

In brief, one can conclude that financial institutions internalise the external costs associated with catastrophic risk only to a limited degree. This is due to frictions and transaction costs in markets and the financial system which prevent the different parties from “pricing in” the external costs.

2.2 The internalisation of external costs at the intra-firm level (corporate governance and stakeholders’ incentives)

This section opens the black box of a financial institution and considers the organisational structure and the role of differing stakeholders, or corporate governance. Financial institutions must balance the interests and objectives of different groups. Typically, the various groups, or stakeholders, have incentives and objectives that follow from the structure of their claim and the pay-off function they face. Most importantly, the stakeholders who are in control in normal times – the shareholders and the managers – usually have incentives that are biased toward excessive risk-taking compared to the other stakeholders.

Risk-shifting incentives of shareholders. Shareholders have an asymmetric pay-off function because they profit fully from the “upside” of increased risk-taking but are partially protected from the downside due to limited liability (debt holders and depositors face the remainder of the “downside”). Hence, shareholders have a pay-off structure that resembles a long call option, and they tend to take on too much risk. Specifically, shareholders

have insufficient incentives to deal with extreme events because they do not internalise the costs of such events, either to depositors and debt holders or to the financial system. Thus, the internalisation problem with respect to extreme events is aggravated in the case of shareholder control.

Manager incentives. The incentives of the managers and other risk-takers in financial institutions are partly defined by the remuneration scheme and broader career concerns (e.g. reputation and labour market opportunities). Remuneration schemes have often been tilted towards short-run gains. Moreover, remuneration cannot be negative, which implies that managers have a long call-like pay-off function similar to that of shareholders. Moreover, job market opportunities may also favour short-term behaviour. In boom periods, managers who boost their institution’s profits can increase their own “market value” significantly. In general, the time horizon of managers tends to be much shorter than the frequency with which extreme events occur, dampening the incentives to take precautions.

(Implicit) guarantees by authorities and third parties. Financial institutions and their stakeholders also enjoy explicit or implicit guarantees that provide incentives to disregard the “downside” of risky strategies. For instance, the implicit backing of a government in the event of failure may reduce institutions’ incentives to invest in robustness. A government faces the fundamental problem of not being able to credibly commit itself to not bailing out financial institutions. In addition, even in a crisis, a government may need to rely on the knowledge and skills of the existing management and may consequently be unable to adequately “punish” them (Acemoglu, 2009).

As an example of the importance of intra-firm incentives, consider the current debate on the shortcomings of the corporate governance of large banks as listed public companies. More specifically, the concern is about the shareholder-value orientation and the shortcomings of executive pay. Commentators (from business, academia and the regulatory sphere) often argue that other corporate governance forms, such as partnerships, would provide better incentives for the decision-makers with respect to risk-taking.⁽¹⁾ The debate is far from over, but suggests that corporate governance plays an important role for the incentives to invest in robustness.

(1) See Wired Magazine (2009); Glassman and Nolan (2009); Knowledge@Wharton (2009); Financial Times (2009); Wharton School (2005).

Box 2 – The importance of liquidity: maturity mismatch, liquidity risk and financial contracting (continued)

Considering the systemic relevance of the design of financial structure and claims (i.e. the maturity mismatch and short-term nature of funding), what are financial institutions' incentives to choose an appropriate design for financial contracts?

Financial contracting and liquidity risks

Basically, financial contracting must take into account asymmetric information and the resulting potential for adverse behaviour of contracting parties. As a solution, liquidation threats can play an important role as a discipline device in the design of financial claims. For instance, the fragility of financial institutions through the nature of demandable debt (deposits) may be considered to be a direct response to alleviating the agency problems of banks. The capital structure determines their fragility due to the liquidation threat and is therefore a device with which to discipline managers (see Calomiris and Kahn, 1991; Diamond, 1984). Fragility of banks may also fulfil other roles, such as providing a commitment device for bank managers to provide liquidity (Diamond and Rajan, 2000, 2001). Other examples of liquidation/withdrawal threats are investors in their role as limited partners in partnerships (e.g. hedge funds – see Shleifer and Vishny, 1997); and prime brokers who may withdraw their funding from traders/hedge funds. Thus, withdrawal threats are a double-edged sword. On the one hand, they are a valuable disciplining device for managing agency problems in financial contracting. On the other hand, they give rise to systemic fragility and channels of contagion.

Incentives for proper liquidity management

In addition, the question of the incentives for financial institutions to appropriately manage liquidity risk surfaces. Maintaining a high level of liquid assets is costly for financial institutions (more liquid assets allow for a greater degree of freedom and hence are more expensive than illiquid assets – see Jones and Ostroy, 1984), but liquidity turns out to be very valuable in an extreme event where many asset classes except the more standard and robust ones are becoming illiquid. Hence, there may be a concern that some financial institutions under-invest in liquidity. Similarly, financial institutions' business model decisions may also reflect insufficient incentives to invest in robustness. Take the case of institutions like Northern Rock or Hypo Real Estate (HRE), which relied almost entirely on wholesale funding (and issuance in the covered bond market) and were highly dependent on liquidity in these markets.

3. Policy examples

Financial policy-makers around the world are currently proposing a wide range of regulatory and supervisory measures to restore the normal functioning of the financial system. Note, however, that policymakers are constrained in the choice of measures. Feasible measures include those that target the business model (e.g. permission to open branches), the legal or the organizational form of financial institutions and quantitative/nominal restrictions (e.g. capital requirements or limits on growth rates). This section presents some specific examples and discusses how they can improve risk modelling and/or

incentives, in order to reduce the likelihood of extreme events in the future.

3.1 Macro-prudential supervision

The possible realisation of an extreme event demonstrates that the prudential control framework needs to rest on two complementary pillars: a powerful micro-prudential function focusing on the stability of individual institutions but also a strong macro-prudential function, concentrating on systemic stability. Indeed, the fundamental characteristic of a macro-prudential approach is to take a

system-wide view with respect to the distribution of risk in the financial system, both at a given point in time (cross-sectional distribution) and over time (pro-cyclicality). In addition, the micro- and macro-prudential control functions are not only complementary but they also reinforce each other. Macro-prudential analysis allows micro-prudential supervisors to better identify possible weaknesses of individual banks. Conversely, macro-prudential analysis can not be undertaken in isolation and should rest on micro-prudential data and close contacts with the supervisors. For this reason, it is very important for the supervisory architecture to foster strong and regular interactions between those involved in micro- and macro-prudential supervision.

In this respect, the recent de Larosière Report makes some important proposals.⁽¹⁾ First, the report calls for the creation of a European System Risk Council (ESRC) under the auspices of the European Central Bank. The objective of the ESRC – which could be compared to a “systemic risk supervisor” – would be to improve macro-prudential supervision in Europe. In addition to the ESRC, the de Larosière Report recommends establishing a European System of Financial Supervisors (ESFS). This framework will further foster co-operation between micro and macro prudential authorities. Finally, the report also calls for more important role of the International Monetary Fund (IMF) in tracking and controlling systemic risk. Specifically, the IMF should operate a global financial stability early warning system to track systemic risk and should support efforts of the international community to deal with jurisdictions with weak regulatory standard.

3.2 System robustness

One of the properties of a complex adaptive system is that not all nodes in the system have equal importance for the stability of the system, since some systemically important players will endogenously develop. Therefore, the concern of macro-prudential authorities on robustness of the system also implies that they should be able to assess and include the impact of these players on the robustness of the system in their analysis. Similarly, the nature of complex adaptive systems suggests that all systemically important institutions should be subject to micro-prudential control, and this holds independently of their legal form or activities. As a consequence, the perimeter of the regulatory and supervisory framework should be based at least in part on the significance of financial institutions for the robustness of the system. In

other words, the question of whether a given institution should be regulated (and how) should not only depend on the legal structure or institutional form, but also on its systemic importance. In this respect, market observers have raised some specific issues:

The “shadow” banking system. In recent years, unregulated financial institutions such as hedge funds, private equity firms or structured finance vehicles, have gained significant importance in the financial system. Structured finance vehicles contributed significantly to the crisis. Although they allowed large banks to seemingly unload credit risk, they were also plagued by the same vulnerabilities as regulated institutions, namely a high maturity mismatch, high leverage and hence liquidity risk.

Hedge funds have also gained in importance, and it is still not clear whether they have contributed to the actual crisis. They have become significant players in many market segments and tend to be highly leveraged, which implies that they can potentially cause or amplify severe shocks. Moreover, their activities are highly opaque, which makes external risk assessment very difficult. Hence, regulatory efforts have been undertaken to improve transparency and “indirect regulation”, with the aim of better assessing risk concentration in the system and ensuring that counterparties do not provide excessive leverage to hedge funds. Discussion of regulation of hedge funds is also ongoing.

Systemically important institutions. Some market observers have also contemplated the introduction of special measures for systemically important credit institutions. One idea is to estimate measures of systemic risks for groups of institutions and then calculating the contribution of each institution to systemic risk. Systemically important institutions – which would be defined as those which contribute significantly to system-wide risk – might then be subject to special regulation. However, it may be quite difficult to make a clear delineation between systemically unimportant and systemically important institutions. Also, institutions may be individually insignificant but, collectively, systemically important (consider for instance the failure of the savings and loan associations in the US the associated crisis in the 1980's).

3.3 Pro-cyclicality

The dynamic and cyclical nature of the financial system has been the source of a great deal of attention by policymakers, especially as risk models – together with regulation based on these models – may have contributed to pro-cyclical behaviour; i.e., to a situation where

(1) The report is available at:
http://ec.europa.eu/commission_barroso/president/pdf/statement_20090225_en.pdf

the cyclical behaviour of financial institutions accentuates business cycles in the economy. At this stage, several proposals have been brought forward for dampening pro-cyclical behaviour in the financial system and/or for weakening the pro-cyclical effects of existing regulation. The proposed measures focus mainly on three areas: reducing the excessive cyclicity of capital requirements, introducing loan loss provisions and constraining and limiting the pro-cyclical effect of leverage and valuation.⁽¹⁾

Indeed, measures targeted at reducing pro-cyclicality may contribute to a better macro-prudential governance of systemic risk and also address the incentive problems. Most extreme events in the financial system arise through the bursting of a bubble and are thus the result of collective overshooting behaviour (herding) of financial system participants.

If adequately designed, such measures may reduce the accumulation of systemic risk in the system. However, it is not yet clear whether such measures can be efficiently designed and whether they will be effective in preventing the accumulation of risk over time.

3.4 Introducing a central clearing party in CDS markets

Market infrastructure is also likely to play a role in the way in which financial institutions are able to internalize systemic risk. For instance, credit default swaps (CDS) are currently traded over the counter (OTC). OTC trading is inherently opaque and prone to operational and counterparty risk. As a consequence, counterparties trading CDS over the counter do not internalize the externalities of their bilateral agreements on other parties. Specifically, by selling credit default protection to a given party, the seller increases the counterparty risk to other parties which have previously purchased credit protection from this seller and whose contracts are still outstanding.

Policy makers are going to introduce a central clearing party (CCP) in the CDS market. A central clearing party will eliminate counterparty risks for the individual parties and allow for a more efficient governance of risk by netting the various bilateral contracts. Note, however, that the central clearing party must be robust. Otherwise, instead of counterparty risk, other risks stemming from a single-point-of-failure may arise. However, supervisors of financial infrastructure have experience in dealing with such risks from which regulators can benefit.

(1) See Financial Stability Forum (2009).

(2) See the article "Reforming remuneration schemes in the financial industry: some governance and implementation issues" in this FSR.

3.5 Improving corporate governance and incentives

As discussed above, the governance structure of financial institutions and their remuneration practices can have a strong impact on the risk taking incentives of the institution. In the current policy discussion, reforming remuneration schemes in large financial institutions is high on the agenda.⁽²⁾ This is surely an important aspect of improving incentives, as this will shift the incentives of risk-takers within financial institutions towards long-term performance, internalizing to a better degree the externalities of systemic risk. Besides the structure of the remuneration scheme, other features of governance are likely to influence incentives and therefore deserve a careful assessment. For instance, the composition of the supervisory board, the role of shareholders, and the position of risk managers in the corporate hierarchy are all important determinants of the incentives of (publicly traded) financial institutions to invest in robustness.

Business model decisions and the choice of the corporate governance structure will also impact on the external costs that a failure of an institution imposes on the system. In this respect, policymakers may want to push institutions to organize their major business units as separate legal entities to facilitate the liquidation or sale of units in case of failure of the institution.

Conclusion

This article explores some of the factors that can underlie a build-up of risk in financial institutions and the system. One factor relates to the shortcomings of risk models and, in particular, the absence of a systemic dimension which would reflect the complexities and interdependencies within the financial system and the impact of the institutions' own behaviour on the system. Another factor concerns the inadequate incentives that financial institutions have to invest in preventing extreme events. The failure of an individual financial institution can have an impact on the entire financial system; however, financial institutions do not "internalise" the negative external costs they impose on other financial system participants and the wider economy when making decisions related to their robustness.

The extreme event which we have experienced in recent months has confirmed that a sound supervisory framework should rest on two strong pillars: namely the micro- and macro-prudential supervision. Authorities should therefore continue to invest in their prudential regulatory framework in order to further strengthen the supervision of overall system robustness (i.e. macro-prudential

supervision) as well as the supervision of individual financial institutions (micro-prudential supervision). In this respect, the recent de Larosière report recommends the creation of the European System Risk Council (ESRC) and the European System of Financial Supervisors (ESFS). This framework will further foster strong and regular interactions between those performing micro- and macro-prudential analyses.

Several other regulatory proposals will also contribute to an increase in robustness of the financial system. Proposals to introduce central clearing parties in CDS markets, to regulate the “shadow” banking system (e.g. hedge funds), and to apply specific measures to systemically important institutions reflect concerns about the cross-sectional distribution of systemic risk in the financial system. Proposals aimed at reducing the pro-cyclicality of behaviour of financial institutions address both the incentive problem and concerns about the time-dimension of systemic risk. Proposals for improving corporate governance aim at incentives to invest in robustness.

In conclusion, achieving robustness in the financial system is a complex task. For this, policymakers need a framework that not only focuses on risks related to individual institutions and continuously monitors systemic risk but that is also able to improve the regulation and incentive for individual institutions such that they operate in a way that contributes to the robustness of the financial system.

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Reforming remuneration schemes in the financial industry: some governance and implementation issues

Joachim Keller
Janet Mitchell
Cristina Vespro

Introduction

One of the major and most contentious issues in the current debate on how to restore financial stability is the design of remuneration schemes in financial institutions. Excessive risk-taking by banks was one of the underlying causes of the credit crisis, and it appears that remuneration schemes for key bank personnel (e.g., CEOs, senior management, traders) may have encouraged such risk-taking.

The basic concern is that remuneration schemes have biased decisions towards activities yielding short-term gains and shielded the decision-makers from the downside risk. This problem seems to have gone beyond the executive level in financial institutions, affecting many divisions including the trading room and the business units in which structured finance products were arranged and issued. Employees in certain areas appear to have been more highly rewarded for maximising the volume of transactions and recording up-front profit than for accurately assessing the underlying risk. In addition, the top management of some institutions sought to increase profit by expanding activities which were fast-growing but for which the risk was not well understood. The important role of compensation in the crisis and the need for change are now widely recognised. Indeed, one of the recommendations made by policy-makers at the end of 2008 was for regulators and supervisors to work with market participants to design compensation schemes that avoid rewards for excessive risk-taking.

An illustration of the potential effects of compensation based on short-term profit is the incentive that it provided institutions to issue and securitise (potentially low-quality) loans, rather than holding them on balance sheet. Whereas banks earn origination fees when issuing loans, these fees are typically only recognised over the life of the loan when it is held on balance sheet. In contrast, the origination fee is recognised immediately when the loan is securitised and sold, for example, to an off-balance-sheet entity. Moreover, the bank may earn an additional fee from packaging the loans into the securitised pool. Finally, the bank may be able to record a gain on sale of the loans, thereby “front-loading” the revenues (and the associated bonuses).⁽¹⁾

This article considers some conceptual issues relating to the role of remuneration in financial institutions and discusses current policy proposals in light of these issues. We first observe that remuneration plays an important role in the corporate governance of firms, both nonfinancial and financial. Remuneration is traditionally viewed as one of the key mechanisms for aligning the interests of managers with those of shareholders, thereby helping to resolve agency problems linked to the separation of control and ownership of the firm. Yet, as is discussed in Section 1, the degree to which remuneration will actually succeed in aligning the interests of these two groups will depend upon the power that shareholders have to approve

(1) See Goldman Sachs (2009) for a discussion of other regulatory and accounting advantages of packaging (and re-packaging) loans into structured products rather than retaining them on balance sheet.

(or veto) proposed compensation schemes. This power varies considerably across institutions and countries. In this respect, the design of remuneration schemes may be considered as an agency problem in itself, in that managers may be able to influence “friendly” boards of directors to shape executive remuneration packages to suit their interests. Indeed, one recent observer has suggested that rather than focusing on the symptoms of poor governance (e.g., compensation schemes), it would be preferable to concentrate directly on improving shareholders’ ability to discipline management.⁽¹⁾

Yet, the notion of shareholder interests also includes risk appetite. Financial institutions differ from nonfinancial firms in that excessive risk-taking by the former can have more severe impacts on the financial system and the economy. In fact, the potential externalities associated with the failure of financial institutions provide one of the justifications for regulating them. While prudential regulation is designed to limit risk-taking by financial institutions, the flexibility of financial markets and the speed of innovation mean that regulation will never be able to completely eliminate all excessive risk-taking. It is therefore important to understand the potential links between the compensation schemes for the senior employees of a financial institution and the risk profile of that institution. Prior to the crisis, too little account was taken of the influence of remuneration schemes on risk-taking. Compensation schemes need to provide incentives for behaviour that is consistent with the goals of regulation.

Section 2 discusses the risk appetites of different stakeholders in financial institutions and the implications of aligning managers’ and shareholders’ risk appetites via remuneration schemes. It observes that remuneration schemes which succeed in aligning the interests of managers with those of shareholders may result in either more or less risk-taking than schemes which serve only managerial interests. In addition, since shareholders would prefer a higher level of risk than would debt holders or depositors, it may be desirable to adopt a more conservative approach to the design of remuneration schemes for financial institutions than the traditional corporate governance view of remuneration would suggest. Stated differently, whose risk appetite should remuneration schemes of financial institutions’ managers reflect?

Another feature of financial institutions is that remuneration contracts of non-executive employees (traders, senior employees in investment banking, etc.) are often characterised by a high variable cash component. As a consequence, non-executive personnel sometimes earn considerably higher cash bonuses than the executives. These personnel also often engage in activities that can

have a significant impact on the risk profile of the institution. Moreover, remuneration for non-executive employees is often influenced by the desire to retain staff in the face of labour-market competition. For example, remuneration schemes of traders for institutions’ proprietary trading desks in recent years came to resemble those of hedge funds, whose compensation contracts typically involve an “incentive” component consisting of anywhere between 10 and 25 p.c. of the fund’s return, sometimes above a threshold rate (which can be near the risk-free rate).⁽²⁾ This influence of hedge funds on the compensation of non-executive employees in financial institutions also likely had a “contagion” effect on executive compensation. The resulting implications for compensation schemes and risk-taking within regulated financial institutions suggest that the rise of hedge funds may have played a more central role in the crisis than has previously been acknowledged.

To date, corporate governance codes and regulations have focused on the remuneration of directors and executives, and less attention has been paid to the remuneration schemes of non-executive staff. Disclosure relating to non-executive employees’ compensation is generally not required by regulation nor provided by financial institutions. The circumstances in which special attention needs to be paid to remuneration of non-executives and the degree to which current policy proposals focus on remuneration at all levels within financial institutions are among the issues discussed in the remaining sections of this article.

The article is structured as follows. Section 1 discusses the traditional view of executives’ remuneration in corporate governance and the process through which managerial remuneration is determined. Section 2 considers implications of the pay-setting process for risk-taking in financial institutions and discusses the potential role for regulation. Section 3 discusses a number of current policy proposals relating to remuneration practices in financial institutions and identifies some potential difficulties with respect to implementation, including the challenge of linking compensation to measures of risk.

(1) Charles Calomiris, “Financial Reforms We Can All Agree On”, *The Wall Street Journal*, April 23, 2009.

(2) See, for example, Stultz (2007).

1. The remuneration-setting process: corporate governance and agency problems

Designing a remuneration scheme is not only a means to resolve an agency problem between firm managers and shareholders but is also an agency problem in itself, because of the potential conflicts of interest between shareholders and board members, who in practice set the pay on behalf of shareholders but who may not be an effective agent for the shareholders. Consequently, it is important to understand the process through which remuneration is set and the factors that determine the degree of control shareholders may exert over managers' pay.

The appropriate governance arrangement with regard to remuneration policy should give the responsibility for designing and overseeing pay schemes to independent remuneration committees set up within the board of directors. In addition, it is important to have adequate involvement of shareholders and, in the case of financial institutions, the risk and compliance functions should also play a direct role in setting and moderating remuneration policy. The current crisis has in fact revealed that in the past, management and governance of risk were generally considered to be unrelated to compensation schemes. Little attention was given by banks' control bodies or by supervisory authorities to the implications in terms of risk of the compensation systems in financial institutions.

The remuneration package of executive directors and senior management is normally set by non-executive board members (or supervisory board members in companies with a two-tier board structure⁽¹⁾). In practice, conflicts of interest in compensation decisions arise because executives have the possibility of influencing the decision of the board (supervisory board) on their level of remuneration, particularly in the cases where best practice is ignored and they sit on remuneration committees. A board affected by conflicts of interest may have a poor incentive to bargain in shareholders' interests on the optimal incentive pay.⁽²⁾ Rather, it may use the pay-setting process to influence pay and extract rents. According to best practice in corporate governance, firms should establish within the board a remuneration committee which should be composed exclusively of non-executive directors, the majority of whom should be independent. The role of independent directors or of an independent remuneration committee is to manage conflicts of interest in compensation decisions by bringing an objective view to the pay-setting process. Moreover, these committees should seek advice from independent outside experts.

The possibility for shareholders to adequately manage the conflicts of interest becomes important, especially since managers' interests are often different from those of shareholders. Moreover, as discussed in more detail in Section 2, the risk appetite of managers may also be quite different from that of shareholders. Yet, the actual degree of control shareholders have over executive compensation will depend on a number of factors, including the rights accorded by the corporate governance rules and the regulatory framework to shareholders in the remuneration-setting process, the ownership structure of the firm, and the level of disclosure by the firm of its pay levels and policies. These factors are discussed in the remainder of this section.

1.1 Corporate governance rules

Having a binding vote on directors' remuneration provides shareholders with some control over executive pay. Hence, provided they have sufficient information and expertise to evaluate the remuneration package and sufficient weight in the firm's decisions (i.e. voting rights), shareholders can in fact limit the conflicts of interest arising via compensation structures. When shareholders have only an advisory vote, however, the level of disclosure by the firm becomes important, as it signals the accountability of the firm, and it may also allow shareholders to publicly express an informed (advisory) view regarding the remuneration package or to apply pressure on the board to justify its decisions in terms of pay choices.

The regulatory strategies adopted by European countries differ in the rights granted to shareholders with respect to approval of remuneration schemes.⁽³⁾ Box 1 discusses some of the observed differences, with reference both to regulation and to corporate governance best practice, on the role given to shareholders on remuneration issues.

In general, with respect to the regulatory framework governing directors' and executives' remuneration in European countries, it appears that regulation more frequently covers disclosure of directors' pay, while corporate

(1) Within any institution, there are two functions that must be fulfilled: supervision and management. Some countries (for instance Italy and the UK) use a single-tier board structure, in which both functions are performed within the board of directors. The supervisory function is performed by the non-executive directors of the board and the management function is performed by the executive directors of the board. Normally, shareholders elect board members at the general meeting. Board members appoint executive directors within the board. Other countries (for instance the Netherlands or Germany) use a two-tier board structure. The supervisory function is performed in this case by the board of directors (or supervisory board) and the management function is carried out by the senior management. Shareholders elect the supervisory board members at the general meeting. The supervisory board appoints the senior management.

(2) A board may become passive or "captured" by management for a variety of reasons including: conflicts of interest where directors form the senior management group; board dynamics which often result in deference and politeness towards the chief executive; social ties; and the influence of the chief executive over the appointment of directors.

(3) It should be noted that these rules have been applied only to listed firms.

governance codes have increasingly tended to be applied with respect to the manner in which directors' and executives' compensation is set and disclosed for listed companies.⁽¹⁾

The "comply or explain" principle has formed the basis of the European, code-based approach to corporate governance for listed firms. This approach means that companies adopting the code either confirm that they have complied with the code's provisions or – where they have not – provide an explanation. Differences exist across European countries with regard to adoption of corporate governance codes. In the UK, for instance, the adoption of the *Combined Code* is mandatory under the Listing Rules; companies are required to report on how they have applied the *Combined Code* in their annual report and accounts. In most of the other European countries, adoption of the code is recommended as best practice and companies adopt it on a voluntary basis. However, doubts have recently been expressed concerning the

effectiveness of the principle of "comply or explain" for banks, and sentiment appears to be building for making certain principles legally binding.⁽²⁾

Both regulation and corporate governance code guidance with respect to executive pay appear to have developed earlier and more extensively in the UK (followed by Ireland) than in continental Europe. The tighter regulation in the UK may, to some extent, reflect the ownership structure of UK companies, in light of the fact that diffuse ownership systems give rise to more problems in remuneration-setting. The role that ownership structure may play on shareholders' ability to influence remuneration packages is discussed further in the Section 1.2.

(1) See Ferrarini and Moloney (2005).

(2) In March 2006, the European Corporate Governance Forum, which examines best practices in Member States in the field of corporate governance, issued a public statement on the "comply or explain" principle, which was welcomed by Internal Market and Services Commissioner Charlie McCreevy. There is agreement that "comply or explain" can work only if its surrounding regulatory framework ensures that companies respect the obligation to give reasons for deviations from the applicable corporate governance codes.

Box 1 – Public regulation and corporate governance codes

In several European countries, such as Belgium⁽¹⁾ and Italy⁽²⁾ for instance, shareholders are required by law to approve non-executive directors' fees on a regular basis (normally every two or three years depending on the country and the company). Shareholders, however, are not required to vote on the executives' remuneration package. Nevertheless, share option plans (and similar equity-based plans) require simple majority approval by shareholders prior to implementation.

In Spain and the UK, shareholders have an advisory vote on remuneration schemes. The UK is the most advanced European country in terms of remuneration disclosure and practice.⁽³⁾ As a result of the 2002 revision of the 1985 Companies Act, directors of a listed company are required to submit to shareholders a detailed annual directors' remuneration report for each financial year. The vote of shareholders, however, is purely advisory. The UK also imposes shareholder approval requirements on the adoption of certain option and long-term incentive plans via the Listing Rules. Applicable from 2008, the corporate governance code in Spain recommends that companies submit a remuneration report to shareholders for an advisory vote.⁽⁴⁾

The Netherlands is the only European country (closely followed only by the Scandinavian countries), where, as of 2004, listed companies were legally required to submit the remuneration report for the next financial year and subsequent years for shareholders' approval under a binding resolution.⁽⁵⁾

(1) Under Royal Decrees. The Belgian Corporate Governance Code (Code Lippens 2004, as amended in 2009) contains non-binding provisions regarding executive and non-executive directors' pay, as well as on the level of transparency of the procedure through which executives' remuneration is set and the level of disclosure about directors' remuneration, on an individual basis for all executives and non-executive directors.

(2) Under the Italian Civil Code, Legislative Decree 58/1998. The Italian Corporate Governance Code (Preda Code 1999, as amended in 2006), based on the "comply or explain" principle and adopted by listed companies on a voluntary basis, contains recommendations on directors' remuneration (pay packages aligning the interests of executive directors and shareholders in a medium- to long-term timeframe; majority independent remuneration committee).

(3) Remuneration/incentive schemes in the UK for financial institutions are governed by the following legislation and bodies: the Companies Act 2006, the Combined Code on Corporate Governance, the guidelines issued by the Associations of British Insurers (ABI) and the National Association of Pension Funds (NAPF), UK Listing Rules.

(4) The Unified Code of Good Practices (Código Unificado de Buen Gobierno of the CNMV 2006) for firms traded on the stock market represents the main source of guidelines for the compensation policy in Spain. Compliance with these recommendations is voluntary.

(5) Under the Dutch Civil Code. The Dutch Corporate Governance Code (Tabaksblat Code 2003, as amended in 2008) contains provisions on remuneration policy for directors (supervisory and management board members), disclosure of individual remuneration, and setting up remuneration committees within supervisory boards.

In other countries, such as France, Germany or Switzerland, shareholders have no vote on directors' remuneration, nor on equity-based plans, but do have a binding vote on any capital increase or repurchase of own shares linked to the implementation of share-based plans. In Germany, for instance, a shareholders' vote on equity-based plans is recommended by the corporate governance code, but not all listed companies comply with it.⁽¹⁾ Since 2007, shareholders in France have been able to vote on executives' severance pay.⁽²⁾ In Switzerland, the current provisions contained in the Civil Code are under review.⁽³⁾ The new provisions will strengthen the rights of annual general meetings on compensation issues, by requiring, among other things, that shareholders have a binding vote on compensation packages of non-executive board members and an advisory vote on compensation package of executive board members.

- (1) Directors' remuneration for listed companies in Germany is governed by the following laws/best practices: Stock Corporation Act 1965 (Aktengesetz – AktG), the German Corporate Governance Code (Cromme Code 2002, as amended in 2008), the Commercial Code (Handelsgesetzbuch – HGB), 2005 Management Board Remuneration Disclosure Act (Gesetz über die Offenlegung der Vorstandsvergütung – VorstOG). Remuneration of the members of the supervisory board, in general, is fixed by a resolution of the general meeting by the simple majority or the (higher) majority provided for in the articles of association. The supervisory board fixes the remuneration of management board members.
- (2) L. 2007-1223 (TEPA law of 21 August 2007) governs the severance pay allowances for listed companies ("No rewards for failure"). Under the pressure of government, in October 2008, professionals adopted principles concerning the compensation of executive directors of companies whose shares are admitted to trading on a regulated market. These principles will become effective by 2010.
- (3) Schweizerische Obligationenrecht (OR). The Swiss Code of Best Practice for Corporate Governance (2002, as revised in 2008) is a non-binding, self-regulatory framework established by the Swiss business association "economiesuisse" for listed companies. Recommendations on compensation principally concern the governance process and the structure of variable compensation to be geared to the mid- to long-term performance of the company.

The coverage of corporate governance rules, however, may not be sufficient. While the existing regulatory strategies mainly focus on remuneration schemes for executives and senior management in listed companies, there are no specific legal requirements nor best practice recommendations regarding remuneration of employees at lower hierarchical levels in the organisation. This may be crucial in the case of financial institutions.

In fact, the remuneration contracts of non-executive employees (traders, etc.) in financial institutions are often characterised by a high variable cash component. As a consequence, traders sometimes earn much more than the executives in terms of cash bonuses. Shareholders have no impact on the design of these schemes, which are decided by the business units' managers or by human resource departments and are normally not disclosed. This may not be a problem if senior management's interests are fully aligned with those of shareholders, since in that case it should be in managers' interest to similarly align compensation packages for key employees. On the other hand, to the extent that senior managers' interests are not perfectly aligned with those of shareholders, agency problems associated with the remuneration of non-executive staff may be magnified.

In addition, competition in the labour market can influence compensation packages, and this appears to have been a potentially important factor in recent years for certain key non-executive employees with influence over the risk-taking of the institution. This type of development, however, introduces the possibility that

unregulated financial institutions, such as hedge funds, can exert an indirect influence on the structure of compensation (and activities) of regulated institutions. A study that provides some support for this idea is that of Philippon and Reshef (2009), who compare wages, education and occupations in the US financial and nonfinancial sectors over the past century (1909-2006). These authors observe that the relative rise in the pay and skill levels of finance workers in the US after 1980 was almost identical to that prior to 1930. The analysis suggests that the prime cause of this phenomenon in both periods was financial deregulation. Increases in corporate IPO activities and credit risk were also significant determinants of the relative wage differential between the financial and nonfinancial sectors. In addition, economic "rent" appears to account for between 30 and 50 p.c. of the wage differential observed since 1990. By examining the role of different subsectors of the financial industry, the authors observe that the share of employment and the relative wage both increased rapidly after 1980 in the subsector "other finance" (which includes venture capital, private equity, hedge funds and investment banks), compared to the subsectors "credit intermediation" and "insurance".

1.2 Structure of share ownership

The structure of ownership, or the dispersion of shareholders, will influence the degree to which shareholders can control managerial remuneration. Managers will have more power in firms where share ownership is widely

dispersed and where there is no large shareholder to impose discipline. In the case of dispersed (or diffuse) ownership, one might argue that managers also have more opportunity to fill the board with “friendly” members. This would allow managers to exert influence on the remuneration-setting process and engage in strategies that are suboptimal for shareholders, as they may deviate from the latter’s interests.⁽¹⁾ In such a situation, remuneration schemes might be less performance-sensitive or based on measures of performance that can be manipulated or are easily achieved.

Large shareholders have greater means than dispersed owners to exercise control over managerial compensation. For instance, large shareholders can send a representative to the board of directors or attempt to influence the views of existing board members with respect to the design of remuneration schemes. In addition, in countries where ownership is more concentrated, shareholders may be better able to monitor managers and should also have more incentive to do so in that they suffer less from the collective action problem faced by shareholders under dispersed ownership;⁽²⁾ therefore, there may be less need to rely on the remuneration scheme to align interests. However, large shareholders will vary in terms of their expertise, information, risk appetite, and monitoring capabilities.

1.3 Transparency

The principle of transparency with respect to executive and non-executive directors’ remuneration in listed companies is already well accepted by most countries as good corporate governance. However, different firms and countries apply this principle with varying degrees of intensity, which may also depend on the different ownership structures of listed companies and the ways in which the agency costs problem is perceived in each firm or country. Moreover, even when firms disclose the level of their directors’ remuneration, they usually do not disclose how they actually measure top management performance. Lack of transparency with respect to remuneration is generally justified by confidentiality arguments.

Transparency is even lower for remuneration of non-executive staff. While the existing rules mainly focus on remuneration schemes for board members and senior management in listed companies, no specific disclosure is required by law nor recommended by best practice for remuneration packages of employees at lower hierarchical levels in the organisation. However, the role of disclosure is particularly important in the case of financial institutions, given that the remuneration of certain non-executive staff

may exceed that of executives. As noted above, these pay schemes can in fact have a significant impact on the level of risk-taking of the institution, particularly if the interests of managers who set them are not perfectly aligned with those of shareholders.

Greater disclosure and transparency regarding directors’ and employees’ remuneration and the procedure through which remuneration of executives and other employees is determined could help stakeholders to assess the incentive structure and the extent to which risk-taking is being controlled. Transparency is all the more important given that proposed principles on compensation tend to take the form of general principles and do not provide specific guidelines concerning implementation. These principles recognise flexibility as an important feature, since firms differ in their goals, culture and business models, as well as the regulatory framework and labour markets in which they function. Remuneration policy is still a field in a state of flux, and financial institutions will want to tailor compensation schemes to their own needs. Nevertheless, transparency should facilitate the emergence of best practices, and it may give some power to the principle of “name and shame” in the case of excessive risk-taking or failure to respect the best practices.

To the extent that performance pay schemes will be implemented on a voluntary basis, an ongoing and open dialogue between financial institutions and regulators will be necessary in order to facilitate the development of practices that address both financial stability concerns and the institutions’ need for competitive pay schemes. Effective disclosure will increase firms’ accountability and can sharpen monitoring and enforcement by shareholders, regulators and investors alike.

2. Remuneration and risk-taking

The previous section has discussed the role of remuneration in the context of the agency problem that exists between the shareholders and managers of a firm. To the extent that shareholders have a say in determining managers’ pay, the remuneration scheme can help align the interests of managers with those of the shareholders. On the other hand, to the extent that factors such

(1) See also Bebchuk and Fried (2003).

(2) Collective action problems arise in the dispersed ownership context because shareholders have a common interest in monitoring board and managers’ activities, but no one owner has sufficient private incentive to do it himself, since individual shareholders only receive a small percentage (corresponding to the shareholding) of the total benefits they generate, and monitoring is costly. These problems are exacerbated in the case of executive pay as individual shareholders are unlikely to see great gains from a reduction in pay costs, but they may suffer if management incentives are damaged as a result. In this case, exposure to public scrutiny through increased transparency and shareholders’ voice may induce the board of directors to take greater care in setting executive remuneration.

as lack, or bad implementation, of corporate governance rules, ownership structure or opaque disclosure of pay schemes prevent shareholders from exerting control over remuneration, the remuneration scheme may serve managers' interests. The impact of this situation on the risk profile of the financial institution, however, is uncertain.

An important aspect of the "interests" of shareholders of a financial institution is their risk appetite. This section explores the implications for risk-taking of financial institutions when remuneration schemes are aimed at aligning the interests of managers and shareholders. In order to do this, it is useful first to recall that different stakeholders have differing risk appetites. The optimal level of risk for the financial institution will depend upon the stakeholder whose point of view is being considered. This observation then gives rise to the question of the desirability of aligning managers' and shareholders' risk appetites.

2.1 Financial institutions' stakeholders and their risk appetites

Shareholders are residual claimants on profits and are the formal owners of the bank. Due to the differing payoff structures associated with equity and debt, shareholders and debt holders have differing views with respect to risk-taking. Shareholders may seek to "shift risk", implying for example that the firm will invest in assets that are riskier than those that the debt holders expected. The greater preference of shareholders for risk can be illustrated by considering an increase in the volatility of the firm's business, which is equivalent to a simultaneous increase of the upside and downside risk. While shareholders cash in fully on the higher profits associated with the higher upside risk, they do not incur the additional losses from realisations of the greater downside risk when the firm's revenues are so low that claims of debt holders cannot be met.⁽¹⁾ Hence, shareholders prefer strategies involving a higher degree of risk than is socially desirable. To the extent that management is making the investment decisions and they try to maximise the wealth of shareholders, they will attempt riskier strategies than debt holders would desire.

Debt holders and depositors. Debt holders have fixed claims and only limited control rights, which are typically triggered upon default on debt repayment. Due to the fixed nature of their claims, debt holders do not gain from the increase in the upside risk of a risky strategy but may recover even less due to realisation of the extra downside risk if the firm's revenues do not fully cover the debt repayments. Hence, debt holders are mainly concerned

about the bank's solvency and are averse to a high level of risk-taking. However, they are not able to completely prevent shareholders from taking on risky projects because shareholders have the control rights over the institution. Debt holders often seek to limit excessive risk-taking by including covenants in debt contracts. Depositors can be considered to be uninformed debt holders and may thus be considered to be "represented" by regulators (see Dewatripont and Tirole, 1994).

Regulators are concerned with the impact of bank failure on systemic risk and seek to limit risk-taking by banks that is deemed excessive from a social viewpoint. The specific nature of financial systems, in fact, makes contagion effects more likely and the macro-economic consequences of a shock to the sector more widespread than for non-financial firms.

Managers may be more or less risk averse than shareholders. One may argue that, typically, managers are more risk averse than shareholders, as managers have specific human capital and potentially substantial wealth invested in the firm, and they have limited possibilities to diversify this specific risk, in contrast to shareholders who are assumed to be able to diversify their holdings. This argument implicitly assumes a fixed compensation scheme for managers. The situation can change when managers receive performance-based pay.⁽²⁾ With regard to shareholders' "risk-shifting" discussed above, managers, too, may benefit from the "extra" upside more than they suffer from the "extra" downside and hence might pursue excessively risky strategies. Emphasis on stock price performance in pay packages tends to align managers' interests more closely with those of shareholders. However, managers may be induced to take on even more risk than shareholders would like if the managers are paid with financial instruments that are particularly sensitive to the volatility of the underlying stock (e.g., stock options). Managers and shareholders may also differ with respect to their time horizons. Managers may not see their tenure with the firm as long-term and this may affect their decisions regarding the activities or the strategy of the institution. Finally, these decisions may also be influenced by the managerial labour market and the desire to acquire status.

These observations suggest that shareholders cannot perfectly monitor managers and that a remuneration scheme that succeeds in aligning the interests of managers and shareholders may result in either more or less risk-taking than a managerial remuneration scheme over which

(1) In other words, shareholders can be seen as holding a call option on a firm's stock whose value increases with volatility (Jensen and Meckling, 1976).

(2) See also Devriese, Dewatripont, Heremans and Nguyen (2004) for further discussion on corporate governance of banks and risk attitudes.

shareholders have no control. Variable remuneration above a certain threshold could give managers incentives to take very risky decisions. It is sometimes argued that the pressure on bank managers to maintain shareholder value prior to the crisis pushed them to take on additional risk. It is an open question as to whether this risk was consistent with shareholders' preferences or whether it exceeded shareholders' desires.

2.2 Issues with aligning managers' and shareholders' risk appetites: whose risk appetite should the remuneration scheme reflect?

Given the potential externalities created by bank failures and the greater appetite for risk of shareholders than debt holders, depositors or regulators, one may ask whether it is desirable for bank executives' remuneration schemes to serve to align the interests of shareholders and managers. Alternatively, should remuneration policy for financial institutions be used as a regulatory instrument, designed to limit bank risk-taking perhaps below the level desired by the bank's shareholders? If so, whose preferred level of risk should be the target?

Apart from this normative issue, in practice it may be difficult for shareholders, especially in the case of dispersed ownership, to obtain enough information about remuneration (or business strategy) to judge whether the level of risk of the institution is consistent with their own risk appetite. Furthermore, in the case of dispersed ownership, individual shareholders may have only weak incentives to monitor managers, preferring to free-ride on the monitoring activities of others. In the case of concentrated ownership, large shareholders, when able to exert control, have more power to better align risk-taking with their risk appetite.

In addition, as already noted above, remuneration schemes are often designed to attract, motivate and retain key talent in highly competitive markets. Hence, the structure of compensation may also be influenced by the labour market. One potentially adverse outcome could be a situation where managers or traders take on risky positions or activities in order to influence the short-term performance of the company, receive higher bonuses and thereby increase their value on the labour market. In line with this idea, Sabourian and Sibert (2009) develop a theoretical model that provides an explanation for "how the reward structure in the financial services industry led to a seemingly irrational behaviour of bankers and other employees of financial institutions prior to the financial crisis". Bonus systems that depend on perceived talents, rather than on long-term results, give bankers incentives

to rationally distort their behaviour so that it makes them look competent in the period when they act, even though this may lead to poor results for the firm in the long run.

The potentially significant impacts of risk-taking in financial institutions suggests that there is a need to design compensation schemes that are based on long-term firm-wide profitability and that also take account of regulators' concerns with minimising the risks of systemic crisis which can be triggered by a bank failure.

3. Policy issues

There are currently several policy initiatives underway in Europe to improve corporate governance and compensation schemes as key elements in the effective management of financial institutions and as complements to banking regulation. Table 1 provides an overview of some of the recent proposals relating to remuneration. The proposals are described along the following dimensions: coverage within the financial institution; governance of compensation; alignment of compensation schemes and performance measures; and supervisory oversight and transparency.⁽¹⁾

As can be seen from the table, current policy proposals focus on principles that are important for designing pay schemes that align managers' interests and long-term objectives. Important factors for achieving this include adequate disclosure on remuneration, the balance among different pay package components, the use of appropriate risk-adjusted performance metrics, and the role of independent remuneration committees in setting and overseeing the remuneration policy. However, the proposed guidelines on remuneration schemes tend to be general and often do not provide guidance for supervisors on implementation, as for example with regard to the specific performance measures to be used. In addition, some of the issues discussed in Sections 1 and 2 of this paper do not seem to be explicitly addressed. In particular, the effectiveness of remuneration as a mechanism to align incentives and risk appetites, as well as the question of whose risk appetites should be aligned, is related to the management of agency problems between boards, shareholders, and managers and to monitoring by independent directors, by shareholders, and by regulators.

(1) In several European countries (the Netherlands, etc.), regulatory requirements/principles on corporate governance and more specifically on remuneration schemes are currently under revision.

TABLE 1 PROPOSED GUIDELINES ON REMUNERATION SCHEMES IN FINANCIAL INSTITUTIONS

| | |
|----------------------------|---|
| Policy proposals | <p>Bank of Italy: <i>Regulation on Banks' Organisation and Corporate Governance</i>, March 2008.⁽¹⁾</p> <p>International Institute of Finance (IIF): <i>Final Report of the IIF Committee on Market Best Practices: Principles of Conduct and Best Practice Recommendations</i>, July 2008.⁽²⁾</p> <p>de Larosière Committee (de Larosière): <i>Report by the High-Level Group on Financial Supervision, Chaired by J. de Larosière</i>, February 2009.⁽³⁾</p> <p>Committee of European Banking Supervisors (CEBS): <i>High-level principles of Remuneration Policies</i>, April 2009.⁽⁴⁾</p> <p>Financial Stability Forum (FSF): <i>General principles for sound compensation practices in the financial sector</i>, April 2009.⁽⁵⁾</p> <p>The UK Financial Services Authority (FSA): <i>FSA draft code on remuneration practices</i>, March 2009.⁽⁶⁾</p> <p>European Commission (EC): <i>Commission Recommendation on remuneration policies in the financial services sector</i>, April 2009.⁽⁷⁾</p> |
| Coverage | <p>Bank of Italy: to banks and parent companies of banking groups. The provisions govern the role and functioning of managers and control bodies (bodies charged, with "strategic supervision", "management" and "control" functions) and the relationship between these bodies and the company's structure.</p> <p>IIF: to senior management, investment banking, and wholesale sales and trading of IIF member firms.</p> <p>de Larosière: to management, as well as to proprietary traders and asset managers, in the financial services industry.</p> <p>CEBS: CEBS-regulated firms, to all levels of the organisation and all categories of employees, including members of the management body, with special emphasis on senior employees and other risk-takers and risk-managers in the institution.</p> <p>FSF: to all financial centres; to all bank employees who could impair a bank's financial soundness through their behaviour.</p> <p>FSA: remuneration at all levels in FSA-regulated firms.</p> <p>EC: to risk-taking staff in financial undertakings; a financial undertaking includes, but is not limited to, credit institutions, investment firms, insurance and reinsurance, undertakings, pension funds and collective investment schemes.</p> |
| Governance of compensation | <p>Bank of Italy: majority independent remuneration committee performs advisory tasks on directors' and managers' remuneration.</p> <p>CEBS: the supervisory body should determine the overall remuneration policy, ideally with the aid of an independent remuneration committee; independent review on the implementation of the pay policy to avoid excessive risk-taking.</p> <p>FSF: board of directors must actively oversee, monitor and regularly review the compensation systems at all levels of the organisation; back-office and risk-control employees should not receive variable compensation strongly linked to high revenue or short-term profits.</p> <p>FSA: a formal remuneration committee should reach independent judgements on the implications of remuneration for risk and risk management; this committee should include at least one non-executive member with practical skills and experience of risk management; the Risk and Compliance functions are required to have a significant input in setting the remuneration for other business units.</p> <p>EC: the board should have responsibility for oversight of the operation of the remuneration policy for the financial institution as a whole with an adequate involvement of internal control functions and human resources departments or experts. Board members and other staff involved in the design and operation of remuneration policies should be independent.</p> |

(1) It contains provisions that aim at strengthening the minimum standards of banks' corporate organisation and governance: clear distinction of roles and responsibilities, appropriate checks and balances, balanced composition of governing bodies, effectiveness of controls, monitoring of all company risks and adequacy of information flows. The corporate governance arrangements adopted by banks and banking groups must ensure full, substantial compliance with these provisions by 30 June 2009.

(2) The report represents the broad industry agreement on the need to address the many shortcomings highlighted by the market turbulence. It contains seven principles of conduct on compensation practices.

(3) The de Larosière report analyses the causes of the financial crisis and contains policy proposals on financial regulation and supervision.

(4) The CEBS has developed five general principles on remuneration policy within banking institutions.

(5) The FSF Principles for Sound Compensation Practices issued in April 2009 focus on the way the structure of remuneration can create incentives towards excessive risk taking.

(6) The code contains ten principles followed by guidance on each principle on possible means of compliance. The FSA will use these principles to assess the quality of a firm's remuneration policy.

(7) The European Commission has issued principles on remuneration of risk-taking staff in financial institutions on 30 April 2009. The Commission has also adopted a Recommendation on directors' pay of listed companies.

TABLE 1 PROPOSED GUIDELINES ON REMUNERATION SCHEMES IN FINANCIAL INSTITUTIONS (continued)

| | |
|--|--|
| <p>Alignment of pay schemes/performance measures/form of pay</p> | <p>Italy: remuneration schemes must be consistent with prudent risk management and the company's long-term objectives.</p> <p>IIF: compensation policies should be aligned with shareholder interests and long-term, firm-wide profitability, taking into account overall risk and the cost of capital.</p> <p>de Larosière: bonuses should reflect actual performance, assessed over a multi-year framework.</p> <p>CEBS: pay structures should align personal and company objectives over the long term, avoiding excessive risk-taking; performance pay should be based on individual, business unit and the overall company's performance; performance measures for bonus awards should be adjusted for risks and cost of capital; the bonus should contain a deferred component, based on the risk horizon of the performance (no big bonuses awards purely in upfront cash).</p> <p>FSF: compensation should be adjusted for all types of risk, different risk outcomes, and the time scale of the risk; the structure of pay (cash/equity mix, etc.) should be balanced and consistent with the firm's goals and prudent risk-taking.</p> <p>FSA: remuneration policies must be consistent with effective risk management, including long- and short-term risk, cost of capital and liquidity requirements, and should not encourage excessive risk-taking by employees; financial measures should entail the adjustment of profit measures to reflect the relative riskiness of different activities and should relate to more than one financial year; a significant proportion of the bonus award should be paid in a deferred form, with a deferral period appropriate to the nature of the business and its risks, and should be subject to upward-downward performance adjustments over the deferral period.</p> <p>EC: remuneration policies for risk-taking staff should be consistent with and promote sound and effective risk management; they should strike an appropriate balance between the level of the core pay and the level of the bonus. The payment of the major part of the bonus should be deferred in order to take into account risks linked to the underlying performance through the business cycle. Performance measurement criteria should privilege longer-term performance of financial institutions and adjust the underlying performance for risk, cost of capital and liquidity.</p> |
| <p>Supervisory oversight and engagement by stakeholders Internal/External Transparency</p> | <p>Bank of Italy: the shareholders' meeting must be provided with adequate information on the implementation of remuneration policies; well-designed internal flows of information that allow management decisions to be taken on an informed basis; the Bank of Italy will judge the conformity of compensation and incentive schemes with the set standards.</p> <p>IIF: the approach, principles, and objectives of compensation incentives should be transparent to stakeholders.</p> <p>de Larosière: supervisors should oversee the suitability of financial institutions' compensation policies, in order to avoid excessive risk-taking.</p> <p>CEBS: remuneration policy should be transparent internally and adequately disclosed externally.</p> <p>FSF: supervisors should include compensation practices in their risk assessment; appropriate and timely disclosure on compensation practices (and risk position) toward all stakeholders.</p> <p>FSA: the FSA will use these principles to assess the quality of a firm's remuneration policy, which will be taken into account when assessing a firm's approach to compliance and risk-taking.</p> <p>EC: remuneration policy should be transparent internally and adequately disclosed to stakeholders. Supervisors should ensure that financial institutions apply the principles on sound remuneration policies, taking into account of the nature and scale of the financial institution and the complexity of its activities.</p> |

In terms of the institutions covered by the proposals, one notable feature of virtually all of the proposals is that they apply specifically to financial institutions, both listed and non-listed. This signifies a recognition that previous regulatory concerns with compensation and risk-taking, which were usually either implicit or only piecemeal, needed to be transformed into explicit principles.

One of the key and innovative issues tackled by these policies is that within the institution, the principles apply not only to pay schemes for senior management but also to employees at lower levels, particularly those whose

actions may have an impact on the risk-taking of the institution. There appears to be agreement, for example, that the compensation schemes for key nonexecutive staff should no longer be determined by the business unit managers or by human resource departments. The overall compensation policy should be formulated at the top of the institution's control hierarchy and applied at all levels of the institution.

In terms of governance with respect to oversight and decision making, there seems to be broad agreement on the important role of independent remuneration committees in setting and regularly reviewing the remuneration

policies. Most of the proposed principles also recognise the need for including members in the committee who have the necessary expertise in risk management, in order to avoid excessive risk-taking through pay practices. For the first time, the risk and compliance functions are assigned significant input by certain proposals in setting the remuneration for other business units.

With respect to performance measures, many of the proposed guidelines suggest that compensation policies should be consistent with the desired risk profile of the financial institution, over the long-term. In other words, and in particular with respect to performance-related pay, the financial measures on which the variable part of remuneration is based should be adjusted for risk and sensitive to the time horizon of risk. Only one of the proposals suggests that remuneration should be symmetric in risk outcomes (i.e., adjusted in both positive and negative directions as a result of performance).

One specific issue that arises in relation to this discussion is the difficulty of measuring risk. That fact that compensation schemes for financial institutions currently do not make use of risk-adjusted metrics is perhaps due in part to the limitations in measuring risk. Performance criteria used by banks for determining the variable or the equity-based portion of remuneration have tended to include measures such as share performance, gross operating income, net income, revenues, or earnings per share, which may be subject to financial manipulation⁽¹⁾ or do not provide employees with sufficient incentives to consider the risk undertaken.

In principle, there are at least two ways of mitigating excessive risk-taking by employees, and they are not mutually exclusive. One is to put in place effective risk limits that are independent of compensation. The other is to adjust pay for risk, thereby curbing incentives to take excessive risk in the first place. In either case, it is important to assess the risks taken in a reliable fashion and to make sure that the limits that are imposed are effective. Failure by either of these methods to capture the true risk is likely to result in excessive risk-taking. The proposals, by recommending that variable pay is linked to risk, refer to measures of risk and also to measures of risk outcomes. However, they do not offer guidelines regarding implementation. Adjusting remuneration for

risk, while desirable in principle, may be quite difficult to achieve in practice.⁽²⁾

Moreover, one issue which is not explicitly addressed in these proposals is the meaning of the term “excessive” risk, which again raises the question of whose risk appetite should be used as the benchmark.

Finally, concerning disclosure, most policy proposals recognise transparency with respect to remuneration schemes at all levels as important for assessing pay scales and incentive structures. Disclosure should be related to risk management as well and should make it easier for all stakeholders to assess the relation between pay and risk-adjusted performance. At the same time, exposure to public scrutiny encourages the board of directors to take greater care in setting remuneration.

In terms of the possibility for shareholders to review the board’s actions in this area and to react to any potential abuse, only the regulation issued by the Bank of Italy specifically states that the shareholders’ meeting will approve remuneration policies for directors, employees, and external collaborators, as well as equity-based plans.

Conclusions

The current financial crisis has put remuneration schemes in the financial sector at the heart of ongoing debate on corporate governance reform and financial stability. The structure of variable pay schemes is in fact seen as one factor that has aggravated the crisis (and according to some observers, directly contributed to it). Compensation schemes appear to have resulted in excessive risk-taking by financial institutions.

This article has considered some conceptual issues relating to the role of remuneration in financial institutions and discussed current policy proposals in light of these issues. One of the first observations is that remuneration has traditionally been viewed in the context of the corporate governance of firms, serving to align the interests of firm managers and shareholders. Rules that have been developed in this context have generally applied only to the executives of listed firms, both non-financial and financial. In this framework, improving shareholders’ powers to approve or veto remuneration schemes, their incentives to monitor firm management and the information they receive regarding the firm’s remuneration policies will all contribute to the effective alignment of managerial and shareholders’ interests.

(1) For instance, increasing leverage is a technique that can be used to boost earnings per share.

(2) The FSA specifically recommends basing financial performance measures principally on profits, which are a better measure than revenues or turnover from this point of view, but they should be adjusted for risks. Common techniques to adjust profits and capital for risks are based on the calculation of economic profit or economic capital. However, accounting profits do not capture adequately future risks and the FSA acknowledges that a certain degree of judgement in decisions on the performance-related part of remuneration is necessary.

However, the importance of risk-taking in financial institutions, together with their regulated status, raises questions regarding the degree to which the traditional corporate governance approach to remuneration design in financial institutions is actually desirable. Shareholders prefer greater risk-taking than do debt holders and depositors, suggesting that it may be desirable to adopt a more conservative approach to the design of remuneration schemes for financial institutions. For instance, the level of risk that was taken at some institutions prior to the crisis may have been consistent with shareholders' risk appetites, but "excessive" from the regulator's or the social point of view.⁽¹⁾ This issue has received relatively little attention to date.

Another important issue for financial institutions is the link between remuneration schemes for key non-executive staff (such as traders) and the risk profile of the institution. The potential impact of compensation on risk-taking at all levels in a financial institution and the resulting effects on the risk profile of the entire institution argue for formulating remuneration policy proposals specifically for financial institutions. Such proposals should also foresee the integral involvement of risk and compliance personnel in the design and implementation of remuneration schemes within the institution.

The proposals reviewed in Section 3 embody these ideas. They apply directly to financial institutions, both listed and non-listed; they envisage a significant role for the risk management function in the design of remuneration schemes; and they specify that the institution's remuneration policy should apply to all staff engaged in risk-taking activities. These proposals make explicit the role of compensation in the internal risk governance of financial institutions.

Finally, there is a need to design compensation schemes that are based on long-term profitability and that also take account of regulators' concerns with minimising the risk of systemic crisis which can be triggered by a bank failure. In fact, most of the proposals discussed in Section 3 call for linking compensation with risk or with risk-adjusted measures of long-term performance. Yet, the proposals do not provide guidelines for implementation. This is significant, since reliance on imperfect risk measures may not achieve the intended effect and, more importantly, may create arbitrage-like opportunities for taking on risk that is unrecognised by the measures. Adjusting remuneration for risk, while desirable in principle, may be quite difficult to achieve in practice.

(1) As is pointed out in the FSA's Turner report, many senior managers of financial institutions that have suffered from the crisis were large shareholders in their firms and had invested large proportions of their cash bonuses in their firms' shares.

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What determines euro area bank CDS spreads ?

Jan Annaert
 Marc De Ceuster
 Patrick Van Roy
 Cristina Vespro

Introduction

In recent years, market participants and regulators alike have begun to look to bank credit default swap (CDS) spreads as indicators of bank credit risk. Indeed, since the financial crisis began in mid-2007, bank CDS spreads have increased considerably, and by as much as several hundred basis points for some banks. Recent regulatory initiatives have also used CDS spreads for pricing government guarantees for bank debt and for recapitalization instruments (ECB, 2008a and 2008b). However, little is known about the determinants of bank CDS spreads and, in particular, the degree to which credit risk or some other factors might account for these increases.

Recent studies focusing on non-financial firms indeed suggest that, in addition to credit risk, CDS spreads reflect other factors such as liquidity (see e.g. Tang and Yan, 2008). Yet, because banks are considerably more opaque than non-financial firms and banks' business models are different, it is an open question whether the results for non-financial firms also apply to banks.

This article presents an empirical analysis of the determinants of CDS spread changes for 31 listed euro area banks over the period from 1 January 2004 to 22 October 2008. Interestingly, to date hardly any attempt has been made to assess the determinants of CDS spreads for financial institutions.⁽¹⁾ In choosing the determinants of changes in CDS premia, we use variables suggested by structural credit risk models as well as a variable reflecting CDS market liquidity. We also find that adding variables reflecting

general economic conditions (which could potentially capture factors such as systematic credit risk or risk aversion) improves the explanatory power of our model.

The analysis reveals three main results. First, the determinants of changes in bank CDS spreads exhibit significant time variation. Second, variables suggested by structural credit risk models are not significant in explaining bank CDS spread changes, either in the period prior to the crisis or in the crisis period itself. However, some of the variables proxying for general economic conditions are significant, but the magnitude of the coefficient estimates and their sign have changed over time. Third, CDS market liquidity became a significant factor in explaining bank CDS spread changes when the crisis broke out in the summer of 2007.

The remainder of this article is organised as follows. Section 1 gives some background information on credit default swaps. In Section 2, we discuss the potential determinants of CDS spreads, which include credit risk, CDS market liquidity and general economic conditions. Section 3 presents our data and model. Section 4 reports the results of our empirical analysis. The last section concludes.

(1) Notable exceptions are Düllmann and Sosinska (2007), who analyse the CDS spreads for 3 German banks and Raunig and Scheicher (2009), who contrast bank CDS spreads to those in other industries.

1. Credit default swaps: background information

Credit default swaps are credit derivatives traded on over-the-counter (OTC) markets, and which function like a traded insurance contract in which a protection buyer accepts to pay a periodic fee (called “spread” or “premium”) in exchange for a payment by the protection seller in the case of a credit event (bankruptcy, failure to pay, etc.) on a reference entity. Credit default swap spreads should be therefore closely linked to the credit quality of the reference entity and should represent a measure of its credit risk. In recent years, CDS spreads have acquired a prominent role as market-based credit indicators thanks to stellar growth of the CDS market. For instance, the Bank for International Settlements (BIS) estimates the outstanding amounts on CDS to have risen from about 6 trillion USD in December 2004 to 57 trillion USD in June 2008.

The remainder of this section describes the recent evolution of euro area bank CDS spreads before comparing CDS spreads with other indicators of credit risk.

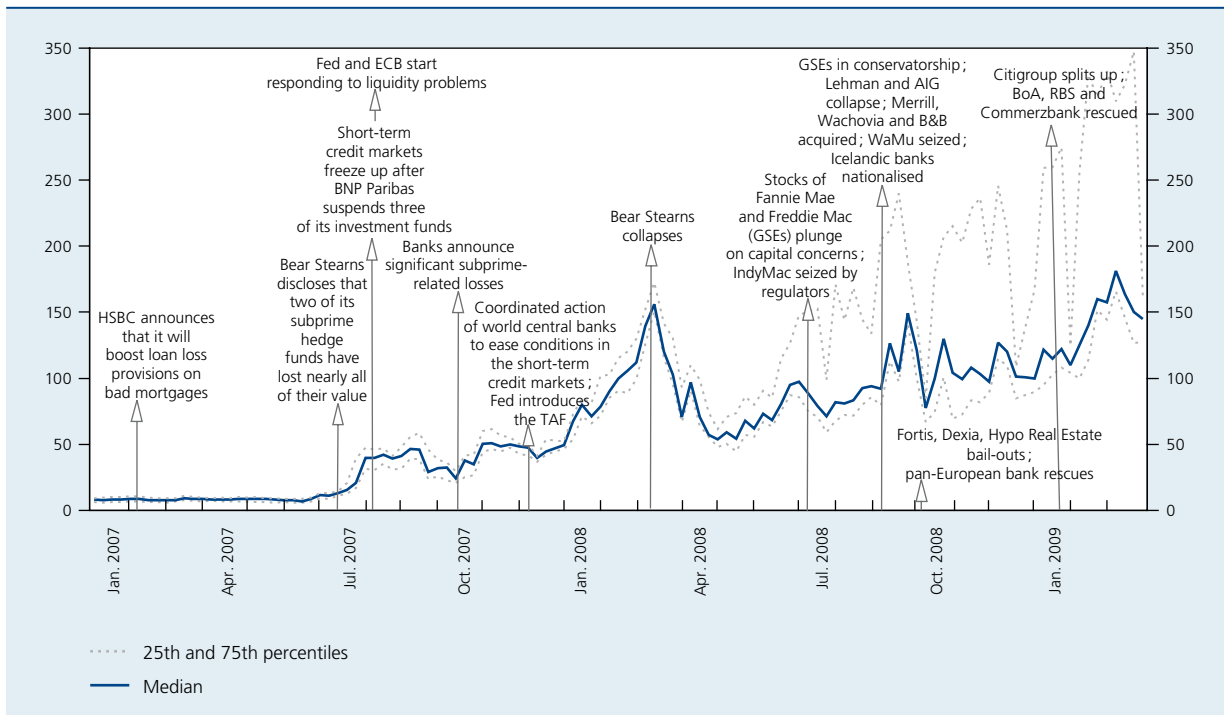
1.1 Recent evolution of euro area bank CDS spreads

Chart 1 and the subsequent discussion illustrate the evolution of CDS spreads of a sample of large euro area banks between 1 January 2007 and 31 March 2009 (Section 3 details the sample design and composition).

Chart 1 shows that, prior to the summer of 2007, CDS spreads of large euro area banks were relatively low and exhibited low variation. Indeed, the median CDS spread was about 10 basis points (bps), a level similar to what had been observed since early 2004.

Following the announcement by Bear Stearns on 16 July 2007 that two of its subprime hedge funds had lost nearly all of their value, euro area bank CDS spreads started to widen significantly. Over the next few months, spreads further increased due to investors’ concerns about the exposure of banks to subprime mortgages, before somehow stabilising in mid-December following monetary actions by central banks around the world and the introduction of the Term Auction Facility (TAF) by the Federal Reserve (Fed).

CHART 1 CDS SPREADS OF LARGE EURO AREA BANKS, 1 JANUARY 2007 – 31 MARCH 2009
(in basis points)



Source: Datastream, ECB and NBB.

Note: see Section 3 for details about the sample design and composition.

This stabilisation proved to be relatively short-lived as euro area bank CDS spreads started to rise again in early 2008 up to the bail-out of Bear Stearns by the Fed on 14 March. Following the subsequent announcement by the US Treasury of a major package to reform regulation of US financial markets and prevent future financial crises, CDS spreads of euro area banks started to decline significantly in late March. In May, however, this very rapid decline came to a halt perhaps as a result of the negative turn of the global corporate sector credit cycle and weakening housing markets in some euro area countries.

After a moderate increase throughout the summer of 2008, euro area financial institutions' CDS spreads surged in late September, following the failure of Lehman Brothers, the effects of which rapidly spread throughout the financial system contributing to a sudden evaporation of liquidity in many markets. In Europe, the initial market responses to the various national measures announced in early October was positive, as suggested by the marked decrease in bank CDS spreads. However, spreads continued to remain at historically high levels after these interventions, and even through March 2009, suggesting that market participants continued to perceive a high level of systemic risk.

1.2 Comparison of CDS spreads with other indicators of credit risk

CDS spreads are only one of the several indicators available to the market to assess credit risk. Two other well-known measures for credit risk are bond yield spreads and credit ratings.

Bond yield spreads represent the difference between the yield on a risky asset and an equivalent risk-free asset, often proxied by the yield on a government bond or a swap contract. Compared to bond spreads, CDS spreads have two main advantages. First, they do not have to be computed vis-à-vis a risk-free benchmark, as they are directly observable. Second, CDS spreads have been found to react more quickly to information regarding the changes in the credit quality of the underlying name compared to the bond market (Hull et al., 2004).

Credit ratings represent a rating agency's opinion of the creditworthiness of an issuer and the likelihood that an obligation will be repaid on time, in full, with interest. Credit ratings are primarily based on public information supplemented with private information obtained by the rating agency from the issuer.

One important difference between credit ratings and CDS spreads (and also bond spreads) is the frequency at which they change. While CDS and bond spreads potentially change on a daily basis, credit ratings are revised infrequently, as credit rating agencies have rating stability as one of their objectives. If all three measures of credit risk were based on the same information, we would expect credit rating changes to lag behind CDS and bond spread changes. However, as mentioned above, credit rating agencies also base their ratings on private information which is potentially not reflected in CDS and bond spreads. As a result, it is possible that rating changes lead CDS and bond spread changes.

Several papers focusing on bond spreads (see Norden and Weber, 2004, for a review) have found that the bond market anticipates negative but not positive rating events. Interestingly, two studies (Hull et al., 2004, and Norden and Weber, 2004) have confirmed these findings for the CDS market using a set of mostly non-financial firms.

Box 1 further investigates the relationship between CDS spreads and credit ratings for a set of European and US banks. Understanding whether market indicators such as CDS spreads anticipate rating changes is important for at least three reasons. First, from a financial stability perspective, it is important to understand whether CDS spreads are an effective tool to detect and forecast changes in banks' financial condition (assuming that this is proxied by credit rating events). Second, from the point of view of credit rating agencies, it may be interesting to learn whether credit ratings (which are mostly based on public information and reviewed infrequently) may see their accuracy improved when supplemented with information from the CDS market. Third, from an investor's standpoint, it might be interesting to exploit signals coming from CDS spreads if they lead credit rating events.

Box 1 – The relationship between CDS spreads and credit ratings for European and US banks

The purpose of this box is to study the lead-lag relationship between two measures of credit risk (CDS spreads and long-term credit ratings) for a set of banks and, more particularly, to see whether CDS spreads anticipate credit rating events.

The sample consists of daily CDS spreads and long-term ratings from Moody's for 83 banks over the period from 1 January 2003 to 22 October 2008. Both European and US credit institutions are included in the sample, in order to have the largest possible number of credit rating events (a forthcoming NBB working paper provides more information on the sample design and composition). Unsurprisingly, positive rating events (defined as upgrades, positive outlooks and reviews for upgrade) dominate the 2004 to 2006 period whereas negative events (defined as downgrades, negative outlooks and reviews for downgrade) are much more prevalent in 2007 and 2008. An interesting feature of the sample is that it is characterised by much larger movements in CDS spreads than those observed in Hull et al. (2004) and Norden and Weber (2004), particularly at the end of the period considered.

The empirical analysis is conducted by implementing an event-study methodology and bootstrap technique employed by Hull et al. (2004). We first create an adjusted CDS spread for each bank by subtracting a CDS market index spread from the bank's CDS spread. We then consider the changes in adjusted CDS spreads that occur over different time intervals (e.g. [-90 days, -61 days], [-60 days, -31 days], etc.) preceding and following the day on which a particular rating event takes place, defined as event time day zero.⁽¹⁾ The table below reports the results of this exercise.

MEAN CHANGE IN THE ADJUSTED CDS SPREAD DURING AN INTERVAL PRIOR TO OR FOLLOWING A RATING EVENT OCCURRING AT TIME $t=0$

(in basis points)

| | Time interval | [-90, -61] | [-60, -31] | [-30, -1] | [-1, 1] | [1, 10] |
|---|------------------|------------|------------|-----------|----------|---------|
| Downgrades | N. of events: 15 | | | | | |
| | Mean | 22.447** | 24.445* | 58.779* | -14.845 | 13.273 |
| | <i>p</i> -values | 0.020 | 0.064 | 0.065 | 0.745 | 0.367 |
| Negative outlooks and reviews for downgrade | N. of events: 32 | | | | | |
| | Mean | -0.460 | 8.785 | 27.469*** | -1.469 | 6.184** |
| | <i>p</i> -values | 0.534 | 0.146 | 0.008 | 0.560 | 0.030 |
| Upgrades | N. of events: 12 | | | | | |
| | Mean | 1.227 | 2.436 | -0.425 | -1.942** | 0.701 |
| | <i>p</i> -values | 0.703 | 0.916 | 0.454 | 0.010 | 0.756 |
| Positive outlooks and reviews for upgrade | N. of events: 16 | | | | | |
| | Mean | -8.592*** | 6.352 | -5.741** | -1.510** | -0.875 |
| | <i>p</i> -values | 0.004 | 0.976 | 0.018 | 0.042 | 0.202 |

Note: The time interval $[-n_1, -n_2]$ is from n_1 business days before the rating event to n_2 business days before the rating event. The time interval $[1, 10]$ is from 1 day after the rating event to 10 days after the rating event. The adjusted CDS spread is the actual CDS spread observed on a given day adjusted for a CDS market index. The test considers whether the adjusted CDS spread change over a given interval is significantly greater than (smaller than) zero for negative (positive) events. Values significant at 1 p.c., 5 p.c., 10 p.c. are identified by ***, **, *.

(1) Note that we disregard a rating event when it follows the previous event by less than 90 days in order to avoid as far as possible contaminating our results.

The results in the table show that, in line with the existing literature, negative rating events are anticipated by the CDS market. Anticipation in the CDS market is present in the case of actual downgrades, as we observe a significant increase (at the 5 p.c. or 10 p.c. statistical significance level) in the CDS spreads from 90 trading days before the downgrade event (day zero). Interestingly, uncertainty about the rating downgrade seems to wane, as prices rise more when we move closer to the downgrade announcement. A similar but somewhat weaker pattern is observed for negative outlooks and reviews for downgrade: CDS spreads increase significantly (at the 1 p.c. statistical significance level) only in the 30 days preceding the rating event.⁽¹⁾

As far as positive rating events are concerned, the table reveals some anticipation by the CDS market, mostly of the positive outlooks and reviews for upgrade. However, although the results for these types of events are statistically significant, they are small from an economic point of view, as CDS spread changes are all lower than 10 bps in absolute value (compared to at least 22 bps for the negative rating events). This result is in line with the existing literature whose main conclusion is that the market anticipates positive rating events to a much smaller extent than negative ones.

There are at least two possible reasons for the stronger anticipation of negative rating events by the CDS market. First, bad news (which drives negative rating events) may have a larger impact than positive news on investors, thereby translating into a stronger effect on spreads. Second, downgrades are associated with larger rating changes than upgrades in our sample, as evidenced by the fact that only 1 out of the 12 upgrades represents a two-notch rating move, while 5 out of the 15 downgrades are two-notch or three-notch rating changes. We expect the CDS market to anticipate more strongly news which is of a higher importance.

Finally, it is important to point out that our results are also consistent with the fact that credit rating agencies may simply adjust their ratings following changes in CDS spreads. Moody's (2006 and 2007) argues for instance that the market and its own credit ratings react in the same way to news about a company, but that the market moves first and instantaneously, thereby creating a gap between the ratings and the trading levels for the CDS. Moody's subsequently reacts to reduce this gap if news about the issuer is confirmed. The more significant the news and the larger the gap between Moody's credit rating and the market, the higher the probability that Moody's will act.

(1) The evidence of a post-announcement effect for negative outlooks and reviews for downgrade does not seem to be robust, as shifting the post-announcement time interval by only 2 days (i.e. from [+ 1 day, + 10 days] to [+ 3 days, +12 days] or [- 1 day, + 8 days]) returns insignificant results. Note that all our other results hold up to this type of robustness check.

2. The determinants of CDS spreads

Credit risk should be the most important determinant of CDS spreads, as credit default swaps are insurance premia against default of the underlying reference entity. However, other factors related to liquidity or general economic conditions may also play a role. This section discusses more fully variables which are likely to explain the behaviour of CDS spreads in general, but with an eye on the banking sector.

2.1 Variables implied by structural credit risk models

We begin with credit risk factors. In this article, credit risk is proxied by the variables suggested by structural credit risk models initiated by Black and Scholes (1973) and Merton (1974), i.e. the risk-free interest rate, leverage and asset volatility (see Box 2).

Box 2 – The Merton model

Miller and Modigliani (1958) used no arbitrage arguments to derive their well-known irrelevance theorem regarding the use of risk-free debt versus equity. In an economy with neither taxes nor default costs, the total value of the firm is invariant to the capital structure. In the subsequent decade, the potential default costs were introduced and hence theorists started to treat debt as a risky asset. Still, little guidance was given on the valuation of risky debt. Black and Scholes (1973) and Merton (1973, 1974) initiated in their seminal papers the classical theory of risky debt valuation (also called the contingent claim approach or the structural approach).

Merton (1974) considers a firm with an extremely simplified capital structure. This firm has one single homogeneous class of debt outstanding, a zero-coupon bond of nominal value B . The firm promises to pay B on maturity date T . Prior to T , the firm cannot default, issue new senior debt, pay out any cash dividends or make share repurchases. The value of the firm's asset (A) is assumed to follow a diffusion process. The value of the firm is critical for the pay-offs the bond holder will receive at maturity date. If the asset value is higher than the nominal value of the bond, the bond will be repaid and the market value of the equity position will be the residual claim of the difference between the asset value at maturity ($A(T)$) and B . However, if the asset value is not sufficient to repay B , the bond holder will get the remaining asset value $A(T) (< B)$ whereas the equity holder will invoke his limited liability. The following table summarises the cash flows:

| | Bond holder | Equity holder |
|------------|---|--|
| $A(T) > B$ | B | $A(T) - B$ |
| $A(T) < B$ | $A(T)$ | 0 |
| Pay-off | $\min(B, A(T))$ $=$ $B - \max(B - A(T), 0)$ | $A(T) - \min(A(T), B)$ $=$ $\max(A(T) - B, 0)$ |

The pay-off structure clearly reveals that the position of the equity holder can be described as a long European call on the assets with the nominal value of the zero-coupon bond (B) as strike price.⁽¹⁾ The position of the risky bond holder is equivalent to a position in a risk-free bond with the same maturity and a short European put on the assets of the firm. The strike price is also B .

By viewing corporate liabilities as options on the assets of the firm and using the Black and Scholes formula for pricing European put options, Merton (1974) explicitly linked the value of credit risky securities to three variables: the risk-free interest rate, the volatility of the firm's asset value and leverage.

The intuition for each of these variables is as follows. Since bond holders can be thought of as having shorted a put on the assets of the firm, they must be rewarded for the risk that they take. First, higher asset volatility increases the probability that the firm will default on its debt and that the put option will be exercised. Therefore, investors will demand a higher premium to hold corporate debt. Second, the higher the leverage, the more likely it becomes that the firm's assets will drop below the nominal value of its debt at maturity. Again, the higher probability of default will imply a higher risk premium. Finally, a higher risk-free rate makes the firm value process drift at a faster rate from the default boundary, and thus reduces default probability. A lower risk premium thus follows.

(1) A European option is an option that cannot be exercised before expiry day.

RISK-FREE INTEREST RATE

In the Merton model, the risk-free interest rate represents the drift of the value of the assets. An increase in the interest rate implies an increase in the expected growth rate of the firm's value. This leads to decreasing credit spreads as default becomes less likely.

The negative relationship between the risk-free interest rate and credit spreads can also be explained in a macroeconomic setting. Higher interest rates are usually associated with higher economic growth, which should therefore lead to lower default risk hence lower credit spreads. In the long run, however, higher interest rates may also lead to higher funding costs, which may reduce the negative association between the risk-free rate and credit spreads.

LEVERAGE

In the Merton model, the debt-to-asset ratio (leverage) has a positive impact on the credit spread. A higher leverage ratio implies that the asset value can less easily cover debt repayments, increasing the probability of default and credit spreads. Hence, structural credit risk models posit a negative relation between the firm's asset value and its credit spreads.

As the market value of firms' assets cannot be observed, this value is usually proxied by the equity value (returns) for publicly-traded companies. If stock returns fall, the leverage in terms of market value will increase. In turn, higher leverage leads to higher credit spreads. A negative relation between stock returns and credit spreads is thus expected.

ASSET VOLATILITY

Higher asset volatility leads to higher credit spreads because it increases the likelihood that the firm's asset value will fall below the value of the required debt repayment. In practice, asset volatility is often proxied by equity volatility. An increase in equity volatility thus raises the probability that the credit spreads will widen.

2.2 CDS market liquidity

Several papers have documented that CDS spreads seem to be too high to be explained simply by the variables implied by structural credit risk models and that factors linked to CDS market liquidity are also likely to play a role (see, e.g., Bongaerts et al., 2008, and Tang and Yan, 2008).

We therefore introduce a bank-specific CDS liquidity factor and measure it as the bid-ask spread, i.e. the difference between the bid and ask quotes. Arguably, liquidity has multiple facets and can only be imperfectly described by a single statistic. Our choice to use the bid-ask spread is primarily motivated by the lack of data on other proxies of CDS market liquidity; however, there are a number of reasons for relying on this indicator. First, the above-mentioned papers report substantial correlations between the bid-ask spread and other liquidity proxies (e.g. number of quotes per CDS, data on trades or volume of orders). Second, unreported regressions show that the CDS bid-ask spread appears to be unrelated to the other determinants of CDS spreads in our sample. This suggests that the bid-ask spread broadly captures CDS market liquidity and is not being "contaminated" by variables implied by structural credit risk models and by general economic variables.

As protection sellers demand an additional premium for liquidity risk, higher bid-ask spreads are expected to be associated with higher CDS premia.

2.3 Variables reflecting general economic conditions

Most papers exploring the explanatory power of credit risk and liquidity variables for bond and CDS spreads find that regression residuals still contain some degree of common variation, indicating that some common factors are missing from the regression specification (see, e.g., Collin-Dufresne et al., 2001, for bond spreads). It is likely that such common variation reflects factors such as systematic credit risk or risk aversion, which vary according to the state of the business cycle. It is still an open question why these factors are significant, since one would expect their effects to have already been captured by individual credit risk variables.

The following conjectures can nevertheless be made. First, systematic credit risk may impact CDS spread changes because the probability of default increases (and the recovery rate decreases) in periods of economic downturn; hence the risk premium may increase. Second, risk aversion may matter because investors are more concerned with safety in periods of economic downturn, so the required risk premium may also increase.

Given this evidence and the associated conjectures, we introduce several variables that are known to proxy for business conditions, market conditions and/or uncertainty.

SLOPE OF THE TERM STRUCTURE

The slope of the term structure (the spread between the long-term and the short-term rate) is widely acknowledged as a business cycle predictor (see, e.g., Mishkin, 2007). A high slope anticipates improving economic activity, which might in turn increase a firm's growth rate and reduce its default probability. Therefore, a negative relation with credit spreads is expected. A negative relation can also be inferred from the expectations hypothesis of the term structure, which states that an increase in the slope implies an increase in the expected short-term interest rates. Similarly to the discussion of the risk-free interest rate above, an increase in the slope is expected to reduce a firm's default risk.

SWAP SPREADS AND CORPORATE BOND SPREADS

The swap spread (i.e. the difference between a swap rate and a government bond rate of the same maturity) reflects the perceived risk that swap counterparties will fail. Similar to Düllmann and Sosinska (2007), we use the swap spread as an indicator of credit risk in the banking sector, since banks are the most active dealers in the swap market. A positive expected relation with bank CDS spreads thus follows.

Like several other studies (e.g. Collin-Dufresne et al., 2001), we consider the bond yield spread between high- and low-rated securities as a general indicator of credit risk in the economy and therefore expect a positive impact on CDS spreads.

STOCK MARKET RETURN

General business climate improvements (as proxied by an increase in the stock market return) will reduce probabilities of default and will increase recovery rates. A negative relation with CDS spreads thus follows.

STOCK MARKET VOLATILITY

Volatility in the stock market is used as a measure of economic uncertainty, the assumption being that the more volatile the market, the more uncertainty there is about economic prospects. A positive relationship between stock market volatility and CDS spreads is therefore expected.

In the remainder of this article, we analyse the role of the above-mentioned factors in explaining CDS spread changes for a sample of large euro area banks, the composition of which is detailed in the next section.

3. Data description and model specification

3.1 Data description

The analysis uses individual CDS data for 31 listed euro area banks over the period from 1 January 2004 to 22 October 2008.⁽¹⁾ The selection of the banks was based on the availability of CDS quotes and stock prices in Datastream.⁽²⁾

We use 5-year CDS quotes for senior debt issues since these contracts are generally considered to be the most liquid segment of the market. In addition, we work with mid-quotes, which correspond to market-observed (and not extrapolated) spreads, and we use weekly changes, since daily CDS spreads are known to be scanty (see, e.g., Zhu, 2006). Finally, only underlying names with at least 10 weekly credit spread changes are retained, resulting in an unbalanced panel of 5,214 observations with on average 20.6 spreads available per week. We also make use of data on the long-term rating of each bank, which enables results for banks in different rating categories to be compared.

Table 1 presents some descriptive statistics on weekly CDS spread changes of banks across rating categories. In order to account for any structural change that may have occurred after the outbreak of the financial crisis, statistics are not only reported for the entire sample period, but also for the following two sub-periods: 1 January 2004 to 15 July 2007 ("pre-crisis period") and 16 July 2007 to 22 October 2008 ("crisis period").⁽³⁾

Table 1 shows that the average CDS spread change was 0.44 basis points per week over the entire sample period. The descriptive statistics confirm that bank credit spreads varied much more after the crisis began. Furthermore, the volatility (standard deviation) of CDS spread changes is higher for A- than for AA-rated banks, both in the pre-crisis and in the crisis period. Finally, and somewhat surprisingly, average CDS spread changes are slightly higher for AA- than A-rated banks.

(1) Including bank CDS spreads after the end of October 2008 would cause the results to be affected by different government interventions whose application to specific banks is not always identifiable.

(2) The exact composition of the sample is as follows: Dexia, KBC (BE); BNP Paribas, Crédit Agricole, Natixis, Société Générale, Unibail (FR); Bayerische Hypo- und Vereinsbank, Commerzbank, Deutsche Bank, IKB Deutsche Industriebank (DE); Banco de Sabadell, Banco Santander, Banco Bilbao Vizcaya Argentaria (ES); EFG Eurobank Ergasias (GR); Allied Irish Banks, Anglo Irish Bank, Bank of Ireland, Irish Life & Permanent (IE); Banca Italease, Banca Monte dei Paschi di Siena, Banca Popolare di Milano, Banco Popolare, Mediobanca, Ubi Banca, UniCredito Italiano (IT); ING, Fortis Netherlands (NL); Banco BPI, Banco Comercial Português, Banco Espírito Santo (PT).

(3) As mentioned in Section 1, the week of 16 July 2007 is the week during which Bear Stearns disclosed that two of its subprime hedge funds had lost nearly all of their value amid a rapid decline in the market for subprime mortgages, an event seen by many as signalling the start of the crisis.

TABLE 1 DESCRIPTIVE STATISTICS ON WEEKLY BANK CDS SPREAD CHANGES: BREAKDOWN BY LONG-TERM CREDIT RATING AND TIME PERIOD

| | All banks | AA-rated banks | A-rated banks | No rating |
|---|-----------|----------------|---------------|-----------|
| Whole period: 1 January 2004 – 22 October 2008 | | | | |
| Mean | 0.44 | 0.40 | 0.37 | 0.85 |
| Minimum | -251.20 | -155.00 | -251.20 | -143.30 |
| Maximum | 262.50 | 156.70 | 262.50 | 112.50 |
| Std. Deviation | 13.49 | 11.98 | 14.32 | 15.95 |
| N(obs) | 5,214 | 2,488 | 2,071 | 655 |
| Pre-crisis period: 1 January 2004 – 15 July 2007 | | | | |
| Mean | -0.05 | -0.03 | -0.05 | -0.09 |
| Minimum | -18.90 | -4.30 | -14.50 | -18.90 |
| Maximum | 19.70 | 9.80 | 17.00 | 19.70 |
| Std. Deviation | 1.46 | 0.94 | 1.75 | 1.96 |
| N(obs) | 3,782 | 1,798 | 1,490 | 494 |
| Crisis period: 16 July 2007 – 22 October 2008 | | | | |
| Mean | 1.73 | 1.52 | 1.43 | 3.72 |
| Minimum | -251.20 | -155.00 | -251.20 | -143.30 |
| Maximum | 262.50 | 156.70 | 262.50 | 112.50 |
| Std. Deviation | 25.59 | 22.67 | 26.89 | 31.89 |
| N(obs) | 1,432 | 690 | 581 | 161 |

Note: The table reports the mean, minimum, maximum, standard deviation (in basis points) and number of CDS spread changes on respectively the entire sample of banks, AA- and A-rated banks, as well as banks without a long-term rating (including 9 observations with a BBB rating). CDS spreads are from Datastream and long-term credit ratings are from Fitch Ratings.

TABLE 2 EXPLANATORY VARIABLES AND EXPECTED SIGNS ON THE COEFFICIENTS IN THE EMPIRICAL ANALYSIS

| Variable | Description | Expected sign |
|--------------------|--|---------------|
| Δi_t | Change in 2-year euro area government bond yield | - |
| $R_{i,t}$ | Bank stock return | - |
| $\Delta vol_{i,t}$ | Change in weekly historical standard deviation, computed using daily bank stock returns | + |
| $\Delta liq_{i,t}$ | Change in absolute CDS bid-ask spread | + |
| $\Delta slope_t$ | Change in the slope of the term structure, i.e. change in the difference between the 10-year minus the 5-year euro area government bond yield | - |
| $\Delta swap_t$ | Change in 5-year swap spread, i.e. change in the difference between the 5-year European swap rate and the 5-year euro area government bond yield | + |
| $\Delta bsread_t$ | Change in the difference between the Merrill Lynch 5-year BBB and AAA corporate bond spread | + |
| $R_{m,t}$ | Stock market return, proxied by the Datastream euro area stock market index return | - |
| $\Delta volimp_t$ | Change in stock market volatility, computed using the weekly change of the VSTOXX index | + |

3.2 Model specification

In order to analyse the main determinants of weekly CDS spread changes, we estimate the following equation:

$$\Delta CDS_{i,t} = \alpha_1 + \alpha_2 \Delta i_t + \alpha_3 R_{i,t} + \alpha_4 \Delta vol_{i,t} + \alpha_5 \Delta liq_{i,t} + \alpha_6 \Delta slope_t + \alpha_7 \Delta swap_t + \alpha_8 \Delta bspread_t + \alpha_9 R_{m,t} + \alpha_{10} \Delta volimp_t + \varepsilon_{i,t}$$

where the subscripts i and t identify respectively the bank and the time period; Δ denotes weekly changes; CDS is the bank CDS spread; the variable i is the 2-year euro area government bond yield; R and vol are the bank stock return and its volatility (both measured on a weekly basis), liq is the CDS bid-ask spread; $slope$ is the spread between the 10-year and 5-year euro area government bond yield; $swap$ is the spread between the 5-year European swap rate and the 5-year euro area government bond yield; $bspread$ is the spread between the 5-year BBB- and

AAA-rated corporate bond spreads; R_m and $volimp$ are the stock market return and its volatility (both measured on a weekly basis).⁽¹⁾ All variables are expressed in percentage points, except CDS which is in basis points. Table 2 provides the exact definition of all the explanatory variables and the expected signs of their coefficients.

Table 3 reports summary statistics for each variable, for the whole period and for the two sub-periods.

As shown in the table, the crisis period was accompanied by an increase in credit risk (as reflected by the negative change in interest rates, negative bank stock returns and positive change in volatility), worsening liquidity conditions in the CDS market (positive change in the bid-ask spread) and deteriorating general economic conditions (positive

(1) We tried different maturities for i_t , $slope_t$ and $swap_t$, with very similar results to those reported in the article.

TABLE 3 DESCRIPTIVE STATISTICS ON THE EXPLANATORY VARIABLES: BREAKDOWN BY TIME PERIOD

| | Δi_t | $R_{i,t}$ | $\Delta vol_{i,t}$ | $\Delta liq_{i,t}$ | $\Delta slope_t$ | $\Delta swap_t$ | $\Delta bspread_t$ | $R_{m,t}$ | $\Delta volimp_t$ |
|---|--------------|-----------|--------------------|--------------------|------------------|-----------------|--------------------|-----------|-------------------|
| Whole period: 1 January 2004 – 22 October 2008 | | | | | | | | | |
| Mean | 0.00 | -0.04 | 0.04 | 0.09 | 0.00 | 0.00 | 0.01 | 0.06 | 0.16 |
| Minimum | -0.58 | -81.09 | -22.93 | -75.00 | -0.19 | -0.15 | -0.51 | -10.98 | -8.90 |
| Maximum | 0.41 | 73.42 | 33.67 | 100.00 | 0.16 | 0.23 | 0.66 | 5.12 | 15.99 |
| Std. Deviation | 0.12 | 5.09 | 1.59 | 4.27 | 0.04 | 0.04 | 0.09 | 2.26 | 2.95 |
| N(obs) | 5,214 | 5,214 | 5,214 | 4,802 | 5,214 | 5,214 | 4,885 | 5,214 | 5,214 |
| Pre-crisis period: 1 January 2004 – 15 July 2007 | | | | | | | | | |
| Mean | 0.01 | 0.46 | 0.00 | -0.01 | -0.01 | 0.00 | 0.00 | 0.39 | -0.06 |
| Minimum | -0.22 | -11.61 | -10.97 | -25.00 | -0.18 | -0.13 | -0.34 | -6.55 | -8.90 |
| Maximum | 0.25 | 32.24 | 9.71 | 25.00 | 0.07 | 0.06 | 0.43 | 4.45 | 11.69 |
| Std. Deviation | 0.08 | 2.78 | 0.77 | 1.87 | 0.03 | 0.02 | 0.07 | 1.70 | 2.03 |
| N(obs) | 3,782 | 3,782 | 3,782 | 3,463 | 3,782 | 3,782 | 3,453 | 3,782 | 3,782 |
| Crisis period: 16 July 2007 – 22 October 2008 | | | | | | | | | |
| Mean | -0.02 | -1.37 | 0.15 | 0.34 | 0.01 | 0.01 | 0.03 | -0.82 | 0.73 |
| Minimum | -0.58 | -81.09 | -22.93 | -75.00 | -0.19 | -0.15 | -0.51 | -10.98 | -8.63 |
| Maximum | 0.41 | 73.42 | 33.67 | 100.00 | 0.16 | 0.23 | 0.66 | 5.12 | 15.99 |
| Std. Deviation | 0.18 | 8.45 | 2.76 | 7.49 | 0.07 | 0.06 | 0.13 | 3.15 | 4.51 |
| N(obs) | 1,432 | 1,432 | 1,432 | 1,339 | 1,432 | 1,432 | 1,432 | 1,432 | 1,432 |
| t-test: pre-crisis vs. crisis period | | | | | | | | | |
| t-test value | -7.17*** | -8.04*** | 1.94* | 1.69* | 7.06*** | 5.00*** | 8.87*** | -13.84*** | 6.34*** |

Note: The table reports the mean, minimum, maximum, standard deviation (in p.c.) and number of observations on each explanatory variable. All variables are measured on a weekly basis and are summarised in Table 2. The last row presents the results of t -tests for the equality of the means of each explanatory variable across the pre-crisis and crisis periods; ***, ** and * denote significance at the 1 p.c., 5 p.c. and 10 p.c. levels, respectively.

corporate bond and swap spread changes, negative stock market returns and strong increase in stock market volatility).⁽¹⁾ The existence of a significant difference between the pre-crisis and the crisis periods is further confirmed by the last row of Table 3, which reports the results of t -tests for the equality of the means of each explanatory variable across the sub-periods. These tests show that the differences in means across the sub-periods were all statistically significant at the 10 p.c. level and often at the 1 p.c. level.

Finally, an informal comparison of the standard deviations of each variable between the pre-crisis and crisis periods suggests that the volatility of all of these variables increased strongly after mid-July 2007.

4. Empirical results

We estimate the model using ordinary least squares with White cross-section standard errors and covariance to allow for general contemporaneous correlation between the bank residuals.⁽²⁾

Table 4 presents the estimation results for the whole period and our full sample of banks, as well as results for sub-samples based on time periods (pre-crisis and crisis) and credit ratings (AA and A). The last column of the table reports the results of a t -test for equality of the coefficients in the pre-crisis and crisis periods.

Table 5 provides information on the marginal contributions of each variable (in percent) to the overall explanatory power of our regressions for the different time periods and rating categories considered.

4.1 Variables implied by structural credit risk models

Looking at Table 4, variables proxying for credit risk are generally statistically insignificant at the 5 p.c. level, except the change in the risk-free rate (Δi_t) in the regression for AA-rated banks (pre-crisis period) and the bank stock return ($R_{i,t}$) in the regression for A-rated banks (whole sample period), both with the expected negative sign. The R -squared decomposition in Table 5 further shows that the marginal contribution of the credit risk variables to the R -squared never exceeds about 20 p.c. in the regressions.

(1) Note, however, that the positive slope of the yield curve in the crisis period suggests an improvement in general economic conditions.

(2) We rely on ordinary least squares because we find no evidence of bank fixed or random effects.

The insignificance of the credit risk variables in the pre-crisis period echoes warning signals concerning the “global mispricing of risk” sent by several observers before the crisis struck. The insignificance of these variables in the crisis period is somewhat more surprising.

One reason for the insignificance of the credit risk variables may be that structural credit risk models are less applicable to banks than non-banks given the proxy that we use for leverage (stock return). However, there are at least two additional explanations. First, this article focuses on high credit-quality banks (almost exclusively rated A or above), while existing studies which find that credit risk variables play an important role in explaining CDS spreads often consider firms (banks and most often non-banks) of much lower credit quality (typically rated BBB or below). Obviously, credit risk variables are more likely to matter for low credit-quality firms, as they are closer to the default barrier. Second, we report results for relatively long time periods, which increases the likelihood of obtaining insignificant results if the coefficients are time-varying. One-year rolling regressions reported in a companion working paper (Annaert et al., forthcoming) show precisely that the statistical significance of the credit risk variables is highly time-dependent.

This last result shed light on those by Raunig and Scheicher (2009), who contrast the behaviour of financial and non-financial CDS spreads during two main periods (October 2003 to June 2007 and August to December 2007). Regarding the first sub-period, which is very similar to ours, the authors find that the risk-free rate and the idiosyncratic volatility affect bank CDS premia only to a small extent. Regarding the second sub-period, which is much shorter than ours, the authors find that the impact of the risk-free rate and idiosyncratic volatility is identical for banks and non-banks (i.e. negative and significant for the first variable, and positive and significant for the second). Interestingly, when we shorten the crisis period to August to December 2007, we also find that the risk-free rate and the idiosyncratic volatility are significant with the expected sign. It thus seems that the relationship between variables implied by structural credit risk models and bank CDS spreads was quite strong in the first few months of the crisis but that it disintegrated afterwards.

4.2 CDS market liquidity

Looking at Table 4, the change in CDS bid-ask spread ($\Delta liq_{i,t}$) is insignificant in the pre-crisis period but is significant with the expected positive sign in the crisis period for the two rating categories considered. The R -squared decomposition in Table 5 further shows that

TABLE 4 DETERMINANTS OF WEEKLY BANK CDS SPREAD CHANGES: BREAKDOWN BY CREDIT RATING AND TIME PERIOD

| | Whole period: 1 Jan. 2004 – 22 Oct. 2008 | Pre-crisis period: 1 Jan. 2004 – 15 Jul. 2007 | Crisis period: 16 Jul. 2007 – 22 Oct. 2008 | <i>t</i> -test pre-crisis vs. crisis period |
|--------------------------------|---|--|---|--|
| Panel A: all banks | | | | |
| Credit risk | | | | |
| Δi_t | -12.71 (-1.54) | -1.04 (-0.84) | -10.47 (-0.76) | -0.68 |
| $R_{i,t}$ | -0.44 (-1.54) | 0.00 (-0.12) | -0.49 (-1.47) | -1.46 |
| $\Delta vol_{i,t}$ | -1.03 (-1.27) | -0.03 (-0.36) | -1.22 (-1.36) | -1.32 |
| CDS market liquidity | | | | |
| $\Delta liq_{i,t}$ | 0.82*** (4.04) | 0.02 (0.77) | 0.92*** (3.80) | 3.73*** |
| General economic conditions | | | | |
| $\Delta slope_t$ | -39.13* (-1.89) | -4.79 (-1.34) | -26.21 (-0.75) | -0.61 |
| $\Delta swap_t$ | 116.87*** (5.89) | 10.17* (1.79) | 115.34*** (5.45) | 4.81*** |
| $\Delta bspread_t$ | -10.95 (-1.60) | 3.77*** (2.73) | -22.28** (-2.21) | -2.56** |
| $R_{m,t}$ | -0.49 (-1.03) | -0.03 (-0.53) | -1.19 (-1.37) | -1.34 |
| $\Delta volimp_t$ | -0.01 (-1.09) | 0.00 (0.72) | -0.01 (-1.50) | -1.57 |
| Adj. R^2 (in p.c.) | 27.79 | 4.72 | 31.03 | |
| N(obs) | 4,484 | 3,145 | 1,339 | |
| Panel B: AA-rated banks | | | | |
| Credit risk | | | | |
| Δi_t | -13.94 (-1.26) | 0.14 (0.14) | -13.09 (-0.70) | -0.71 |
| $R_{i,t}$ | -0.57 (-1.56) | -0.05*** (-3.39) | -0.67 (-1.58) | -1.47 |
| $\Delta vol_{i,t}$ | -0.81 (-0.80) | 0.03 (0.47) | -0.93 (-0.83) | -0.86 |
| CDS market liquidity | | | | |
| $\Delta liq_{i,t}$ | 0.56* (1.79) | 0.00 (0.40) | 0.76* (1.71) | 1.71* |
| General economic conditions | | | | |
| $\Delta slope_t$ | -46.45* (-1.66) | -0.89 (-0.31) | -37.71 (-0.80) | -0.78 |
| $\Delta swap_t$ | 149.16*** (5.60) | 5.22 (1.01) | 154.23*** (5.33) | 5.08*** |
| $\Delta bspread_t$ | -8.17 (-0.97) | 3.32*** (3.51) | -17.25 (-1.35) | -1.61 |
| $R_{m,t}$ | -0.69 (-1.21) | -0.02 (-0.33) | -1.45 (-1.38) | -1.36 |
| $\Delta volimp_t$ | -0.01* (-1.66) | 0.00 (-0.12) | -0.02** (-2.10) | -2.09** |
| Adj. R^2 (in p.c.) | 30.60 | 8.09 | 34.89 | |
| N(obs) | 2,143 | 1,491 | 652 | |

Note: Panels A, B and C present the estimation results for CDS spreads on respectively the whole sample of banks, AA- and A-rated banks. The model is estimated using ordinary least squares with White cross-section standard errors and covariance to allow for general contemporaneous correlation between the bank residuals. *t*-statistics are given between brackets. The *t*-statistics in the last column refer to the *t*-statistics of a test for equality of the coefficients in the pre-crisis and crisis periods; ***, ** and * denote significance at the 1 p.c., 5 p.c. and 10 p.c. levels, respectively.

TABLE 4 DETERMINANTS OF WEEKLY BANK CDS SPREAD CHANGES: BREAKDOWN BY CREDIT RATING AND TIME PERIOD (continued)

| | Whole period: 1 Jan. 2004 – 22 Oct. 2008 | Pre-crisis period: 1 Jan. 2004 – 15 Jul. 2007 | Crisis period: 16 Jul. 2007 – 22 Oct. 2008 | <i>t</i> -test pre-crisis vs. crisis period |
|-------------------------------|---|--|---|--|
| Panel C: A-rated banks | | | | |
| Credit risk | | | | |
| Δi_t | -12.78** (-1.99) | -1.58 (-0.99) | -11.66 (-1.09) | -0.93 |
| $R_{i,t}$ | -0.38 (-1.47) | 0.00 (-0.12) | -0.45 (-1.49) | -1.49 |
| $\Delta vol_{i,t}$ | -1.02 (-1.34) | -0.02 (-0.30) | -1.26 (-1.52) | -1.50 |
| CDS market liquidity | | | | |
| $\Delta liq_{i,t}$ | 1.17*** (3.71) | 0.08 (1.53) | 1.22*** (3.49) | 3.25*** |
| General economic conditions | | | | |
| $\Delta slope_t$ | -41.77** (-2.10) | -7.06* (-1.69) | -27.40 (-0.89) | -0.66 |
| $\Delta swap_t$ | 113.25*** (6.10) | 12.19** (2.19) | 108.77*** (5.90) | 5.03*** |
| $\Delta bsread_t$ | -16.28* (-1.90) | 5.53*** (2.93) | -31.68*** (-3.05) | -3.53*** |
| $R_{m,t}$ | -0.18 (-0.44) | -0.08 (-1.02) | -0.56 (-0.75) | -0.65 |
| $\Delta volimp_t$ | 0.00 (0.02) | 0.00 (0.45) | 0.00 (-0.14) | -0.21 |
| Adj. R^2 (in p.c.) | 36.48 | 6.98 | 39.44 | |
| N(obs) | 1,794 | 1,241 | 553 | |

Note: Panels A, B and C present the estimation results for CDS spreads on respectively the whole sample of banks, AA- and A-rated banks. The model is estimated using ordinary least squares with White cross-section standard errors and covariance to allow for general contemporaneous correlation between the bank residuals. *t*-statistics are given between brackets. The *t*-statistics in the last column refer to the *t*-statistics of a test for equality of the coefficients in the pre-crisis and crisis periods; ***, ** and * denote significance at the 1 p.c., 5 p.c. and 10 p.c. levels, respectively.

the contribution of the bid-ask spread to the variance in CDS spread changes explained by the model surged after mid-July 2007, especially for A-rated banks.

These results are not inconsistent with existing studies on non-banks, which show that the CDS bid-ask spread does help in explaining CDS spreads, but that its impact depends on the sample considered or the explanatory variables chosen (see, e.g., Tang and Yan, 2008, and Das and Hanouna, 2009). Our results suggest that an additional dimension driving the significance of the bid-ask spread is the time period considered.

The insignificance of the bid-ask spread in the pre-crisis period may be attributed to the global mispricing of risk noted by several observers. The significance of this variable after mid-July 2007 suggests that the liquidity premium earned by protection sellers in the CDS market has increased in recent months, especially for lower-rated banks.

4.3 Variables reflecting general economic conditions

Looking at each variable in turn, the following observations can be made in Table 4.

First, the coefficient on the slope of the term structure ($\Delta slope_t$) has the expected negative sign but is only significant in the regressions which cover the entire sample period. One possible explanation might be that the impact of this variable can only be assessed over sufficiently long time periods, which include substantial movements in the yield curve.

Second, the regression coefficient on the swap spread ($\Delta swap_t$) is generally significant across sub-periods and it has the expected positive sign. This coefficient is much larger in the crisis period than in the pre-crisis period. Indeed, looking at the results for the entire sample of banks, an increase of 13 bps (i.e., one standard deviation) in the swap spread change leads to an increase of 15 bps in bank CDS spread changes after the start of the crisis,

TABLE 5 MARGINAL CONTRIBUTION OF VARIABLES PROXYING FOR CREDIT RISK, CDS MARKET LIQUIDITY AND GENERAL ECONOMIC CONDITIONS TO THE PERCENTAGE OF TOTAL EXPLAINED VARIANCE

| | Whole period: 1 Jan. 2004 – 22 Oct. 2008 | Pre-crisis period: 1 Jan. 2004 – 15 Jul. 2007 | Crisis period: 16 Jul. 2007 – 22 Oct. 2008 |
|---------------------------------------|---|--|---|
| Panel A: all banks | | | |
| Credit risk | 21.75 | 17.75 | 14.93 |
| CDS market liquidity | 35.11 | 9.40 | 55.37 |
| General economic conditions | 43.14 | 72.85 | 29.70 |
| Panel B: AA-rated banks | | | |
| Credit risk | 3.72 | 11.51 | 3.54 |
| CDS market liquidity | 22.53 | 19.69 | 26.71 |
| General economic conditions | 73.74 | 68.79 | 69.75 |
| Panel C: A-rated banks | | | |
| Credit risk | 20.46 | 16.10 | 15.85 |
| CDS market liquidity | 35.52 | 9.70 | 52.70 |
| General economic conditions | 44.02 | 74.21 | 31.45 |

Note: This table shows the marginal contribution (in p.c.) of each block of variables (credit risk variables, liquidity variable and variables proxying for general economic conditions) to the total adjusted R^2 of the regression relative to the contribution of the two other blocks of variables. Formally, the marginal contribution mc_k of the k^{th} block of variables ($k=1, 2, 3$) is defined as:

$$\frac{R^2 - R_k^2}{\sum_{k=1}^n (R^2 - R_k^2)}, \text{ where } mc_k \text{ is } \geq 0 \text{ and } R_k^2 \text{ is computed with the } k^{th} \text{ block of variables excluded. Credit risk variables are } \Delta i_t, R_{i,t} \text{ and } \Delta vol_{i,t}; \text{ CDS market liquidity is measured by } \Delta liq_{i,t}; \text{ variables reflecting general economic conditions are } \Delta slope_t, \Delta swap_t, \Delta bspread_t, R_{m,t} \text{ and } \Delta volimp_t. \text{ Table 2 provides the exact definition of all the explanatory variables.}$$

compared with only 1 bps before. The much larger coefficient observed in the crisis period might be attributed to a re-pricing of credit risk in the banking sector, with changes in the likelihood of bank failure (as measured by the swap spread) translating into higher CDS spreads changes after mid-July 2007.

Third, corporate bond spread changes ($\Delta bspread_t$) are significant with the expected positive sign in the pre-crisis period, both for AA- and A-rated banks. However, in the crisis period, they are insignificant for AA-rated banks, and significant with the wrong sign for A-rated banks. One reason for this rather counter-intuitive result appears to be the joint increase in corporate bond spreads and decrease in CDS spreads of AA- and A-rated banks, which took place in early October 2008 following the first wave of government interventions. Unreported regressions confirm that if we shorten the crisis period to 16 July 2007 – 5 October 2008, corporate bond spread changes have a positive and significant impact on CDS spread changes of AA- and A-rated banks.

Fourth, the stock market return ($R_{m,t}$) and the stock market volatility ($\Delta volimp_t$) are usually insignificant across regressions.

Interestingly, the R -squared decomposition in Table 5 shows that, while 70 p.c. of the explained variation in CDS spread changes of A- and AA-rated banks was related to variables proxying for general economic conditions in the pre-crisis period, this proportion fell to 30 p.c. for A-rated banks while remaining constant for AA-rated banks in the crisis period. This result is consistent with a well-established finding in the credit risk literature, namely that more highly-rated firms tend to be more sensitive to general economic variables than lower-rated firms, which are in turn more sensitive to idiosyncratic factors (Düllmann and Sosinska, 2007).

Finally, looking at Table 4, we see that the adjusted R -squared of the regressions estimated over the whole sample period is between 25 and 40 p.c., which is similar to what other studies on non-financial sector CDS spreads have reported. However, we observe that there is a substantial difference between the adjusted R -squared of the pre-crisis and crisis periods. This last result highlights once again the strong increase in significance of some of our explanatory variables after the start of the crisis.

Conclusion

In recent years, market participants and regulators alike have begun to look to bank credit default swap spreads as indicators of bank credit risk. However, like bond spreads, CDS spreads may also reflect other factors, including a liquidity premium, systematic credit risk or risk aversion. This article presents an empirical analysis of the determinants of euro area bank CDS spread changes before and after the start of the financial crisis. In analysing changes in CDS premia, we use variables suggested by structural credit risk models as well as an indicator of liquidity in the CDS market and several variables proxying for general economic conditions.

A first result is that the determinants of bank CDS spreads are highly time-varying. This finding, which echoes similar results in studies for bond spreads, calls for some caution regarding the use of models which attempt to explain bank CDS spreads. These models must be re-estimated frequently.

A second finding is that variables suggested by structural credit risk models are insignificant, both before and after the start of the crisis, in explaining bank CDS spread changes. In addition, some of the variables proxying for general economic conditions are significant, but the magnitude of the coefficient estimates and their sign changed when the crisis started. These findings suggest that financial institutions' CDS spreads should be examined together with other market indicators (e.g. Expected Default Frequencies, equity prices, etc.).

Finally, CDS market liquidity appears to have become a significant factor in explaining European bank CDS spread changes when the crisis broke out. This finding suggests that the role of CDS market liquidity should be estimated explicitly when analysing CDS spreads. Most existing studies still treat liquidity as being part of the regression residual.

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www.nbb.be



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P. PRAET

Executive Director

National Bank of Belgium
boulevard de Berlaumont 14 – BE-1000 Brussels

Th. TIMMERMANS

Head of the Financial Stability Department

Tel. +32 2 221 44 71 – Fax +32 2 221 31 04

thierry.timmermans@nbb.be

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