Financial Stability Review 2010

National Bank OF BELGIUM

Eurosystem

Contents

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

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Foreword

by Guy Quaden, Governor

The massive intervention by governments and central banks aimed at restoring the smooth operation of the financial system after the financial crisis of September 2008 triggered a gradual economic recovery. Nevertheless, this upturn remains quite uneven, as Europe is clearly lagging behind the US and is even further behind many emerging economies in Asia and South America which are recording strong growth associated with large capital inflows.

For some months, these far-reaching public measures had also seemed to revive risk appetite, as equity prices surged, credit spreads narrowed and asset price volatilities diminished towards the second half of 2009. However, more recent developments have proved that confidence remains extremely fragile. Markets are hovering between their fears about the timing and speed of removal of the fiscal and monetary stimuli, on which economic activity is still heavily dependent, and their concerns about sovereign credit risks linked to mounting government debts and prolonged fiscal deficits.

The mounting doubts over public debt sustainability in some EU countries have created severe tension in the euro area, requiring a new comprehensive package of measures to preserve financial stability in Europe. The speed at which these stresses have emerged has shown that authorities need to act promptly, decisively and in a coordinated manner if they do not want to be systematically outrun by the markets. In the euro area, in particular, fiscal discipline needs to be strengthened, and structural reforms must be accelerated. The ESCB is playing its role to the full to ensure depth and liquidity in dysfunctional market segments, as persistent tensions could translate into rapidly rising long-term interest rates with negative effects on the financing cost of the private and public sectors and the funding conditions of EU banks. A detailed assessment of the overall situation of the Belgian financial sector in this uncertain environment is presented in the Financial Stability Overview introducing this FSR.

The severe market tension observed in May provides confirmation, if any be required, that in-depth reforms are urgently needed to restructure the global financial system. This is no easy task, as it will entail simultaneously phasing out the exceptional public support measures introduced in the aftermath of the crisis and phasing in new rules and requirements that will affect the operating costs of a still vulnerable financial sector. As illustrated in several of the thematic articles of the third section of this FSR, the issues are complex and it will take time first to design and then to implement many of the technical measures. Moreover, the new regulations will have to be closely coordinated at the

international level to deter the use of loopholes or the exploitation of regulatory arbitrage. However, these difficulties cannot be used as a pretext for returning to business as usual, for limiting the range of the necessary reforms or for wasting the impetus and feeling of urgency generated by the crisis itself. While authorities must remain conscious of the regulatory cost imposed by the new measures under consideration, in particular the strengthening of various buffers that serve as protection against financial and operational risks, banks must also be absolutely convinced of the necessity to build up such buffers. This is the only credible alternative to more interventionist measures that would directly restrict the range or scale of activities undertaken by systemic financial institutions.

In this context, the Basel Committee is not only considering higher, and better quality, capital requirements but is also paying particular attention to key risks which played a crucial role in the recent crisis. So liquidity risk will be covered by new quantitative constraints, while the scope of solvency requirements will be enlarged in order to take more accurate account of the systemic dimension of risks. The objective will be to minimise the probability of a costly disruption to the supply of financial services, due either to contagion effects generated by large institutions closely connected with the rest of the system or to consecutive waves of excessive optimism and strong risk aversion in financial markets, likely to create destabilising financial cycles.

A second major area for reform concerns crisis management and resolution, as the best designed regulatory framework will always have to be backed by efficient arrangements to handle situations where major financial institutions face impending risks of failure. An adequate solution will require a combination of regulatory and legal overhaul, better market infrastructure and individual initiatives by the credit institutions themselves. In order to introduce a special recovery procedure applicable to enterprises in the financial sector, the Belgian authorities have joined in the initiatives recently taken in several other countries by passing a law enabling the government, in extreme circumstances, to proceed with the transfer of parts of the assets of credit institutions or securities issued by those institutions. More stringent arrangements to beef up market infrastructures, such as transfer of most over-the-counter derivatives contracts to central counterparties (CCPs), would also contribute to improving the resistance of the system to the distress of individual institutions. The contribution of the National Bank of Belgium to the resilience of financial infrastructures is reviewed in the second section of this FSR, devoted to the oversight activity of the Bank. Finally, the individual financial institutions should be obliged to set up structures and organisational arrangements which, in an emergency, will facilitate their dismantling or division into more homogeneous entities.

These upcoming developments in the regulatory framework and crisis management arrangements will affect the conduct of business, if not the strategies of banking institutions. Several of the latter are restructuring their activities; in the EU, that has often been a prerequisite for obtaining the European Commission's authorisation for state aid interventions. This need to adapt does not only apply to the private sector. The many challenges raised by the globalisation of the financial system also require supervisory authorities to improve the coordination of national policy actions and make more integrated use of their various powers. These objectives have mobilised the IMF and, at the G20 level, the Financial Stability Board while they are the motive for creating a European Systemic Risk Board and a European System of Financial Supervisors. The recent advances towards a more integrated EU structure must not be confined to crisis prevention but should extend to crisis management which call for the creation of a European Resolution Authority.

In Belgium, too, the government has decided to reshape the supervisory architecture. In line with the structure put in place in a growing number of countries, it has opted for the "twin peaks" model in which the central bank takes charge of supervising individual financial intermediaries and the system as a whole, while another institution is responsible for supervising the smooth operation of

the markets, the conformity of financial products and services, and proper consumer information and protection. Admittedly, there is no supervisory model offering an absolute guarantee against financial accidents. Nevertheless, the "twin peaks" model offers several advantages while learning from many of the lessons of the crisis.

The latter has blurred two distinctions which were often used to warrant a separation between central banks and supervisory authorities. First there is the distinction between individual and systemic risks. In an environment where financial markets are tending to be highly concentrated, the separation between a macroprudential approach, defining action by central banks, and the microprudential supervision of credit institutions, which would remain the exclusive preserve of the supervisory authorities, has shown its limitations. This is emphasised by the growing focus of attention on key individual institutions which, by their size or strong interconnectedness with other market participants, have by themselves acquired a systemic character.

The second distinction pertains to the differences between solvency and liquidity issues. In the traditional approach, supervisors' primary duty was to monitor the resilience of individual institutions based, in no small measure, on the adequacy of their solvency buffers. In turn, central banks had to prevent liquidity gridlocks by supplying liquidity to the system and, if needed, by providing emergency assistance to specific institutions. Now the recent crisis has not only confirmed that solvency and liquidity problems are at times quite difficult to disentangle. It has also shown that a deterioration in general liquidity conditions can be a major cause of financial destabilisation, and that such deterioration does not only result from difficulties initially faced by isolated financial intermediaries, but could also be driven by more general developments in an environment where overall market liquidity has become an important complement of institution-specific funding liquidity.

Despite these convergences, potential sources of conflict remain between the various facets of financial surveillance. In some circumstances, the maintenance of the soundness of individual institutions could be at variance with the preservation of market integrity, including consumer protection. The maintenance of two separate institutions facilitates the independent performance of these two key functions.

While the "twin peaks" model undeniably presents numerous advantages, its implementation is raising several operational and managerial issues that the National Bank of Belgium is actively addressing in the limited period of time which the Belgian Government has scheduled for finalising the integration, within the central bank, of the prudential tasks hitherto performed by the CBFA. However, the most crucial challenge will be to achieve an efficient mix of different cultures. The supervision processes, emphasising the use of adequate risk-management tools and compliance with regulations, must be combined with the more global and holistic view traditionally developed within central banks, aimed at detecting cyclical developments and structural trends. In order to achieve efficient and close interaction between these two approaches, the National Bank of Belgium will endeavour to set up the "twin peaks" structure and to perform its new duty to the best of its ability.

Brussels, May 2010

Executive summary

1. Overview

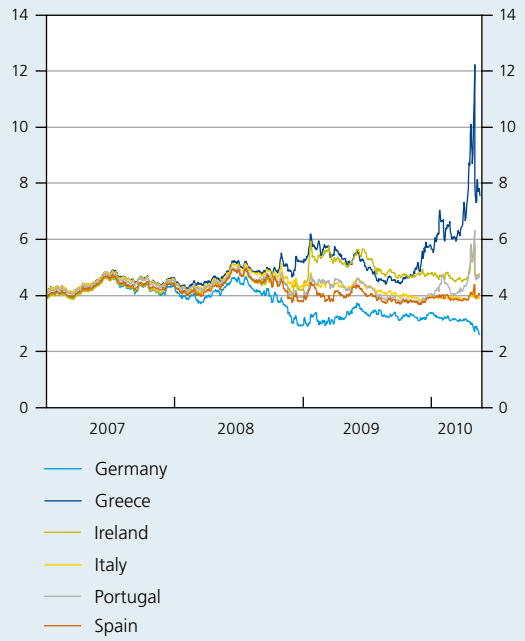
1.1 Operating environment

Several years of low financial market volatility, narrow credit and liquidity risk premiums, and generally favourable market conditions for financial institutions came to an abrupt end in the summer of 2007, when higher than expected delinquencies on US subprime mortgage loans set in motion a sequence of events that would lead to the collapse of investment bank Lehman Brothers on 15 September 2008, extraordinary amounts of central bank and government support measures to stabilise the global financial system and, in the most recent period, heightened market concerns about the sustainability of fiscal positions in the advanced economies. These sovereign risk concerns led to turbulence and impaired liquidity in a number of euro area government debt markets and to a reassessment by investors of their appetite for risk-bearing assets more generally, amidst concerns over the consequences of these ongoing developments – at the time of finalising this article – for the global and European economic recovery.

Some of the financial sector support measures contributed directly to weaker fiscal ratios. Yet, the emergence of an average fiscal deficit in excess of 8 p.c. of GDP in 2009 in the advanced economies and the rise in public debt by almost 17 p.c. of the combined GDP of those countries between the end of 2007 and the end of 2009 primarily reflected the consequences of the sharp contraction of economic activity after the failure of Lehman Brothers, through the operation of automatic stabilisers and the implementation of discretionary fiscal stimulus measures.

The most direct consequence of the increased sovereign risk concerns was a sharp differentiation in the borrowing costs of various sovereigns in the euro area, with Greece,

CHART 1 TEN-YEAR GOVERNMENT BOND YIELDS
(percentages)



Source: Thomson Reuters Datastream.

Portugal and Ireland seeing the most dramatic increases in ten-year government bond yields relative to the German ten-year benchmark (Chart 1). Markets focused in particular on developments in Greece, where the government's revelation of previous fiscal misreporting led to significant upward revisions of the fiscal deficit and public debt figures, and market concerns over the political will and capacity to implement the fiscal and structural reforms necessary to place Greece's public finances on a sustainable path. The announcement of a 110 billion euro

support package for Greece early May did not significantly allay market concerns over the sustainability of Greece's fiscal position, and tensions in other peripheral government bond markets intensified, raising the spectre of potential contagion from the Greek debt crisis spreading to other countries, and to the euro area financial system in general. Towards the end of the week of 3 May, spreads versus German government bonds reached record levels in some peripheral government bond markets, where liquidity was becoming significantly impaired as a result of these contagion fears. In view of these developments, the EU Council agreed during the weekend of 9 May to establish a European Financial Stabilisation Mechanism (EFSM), alongside commitments to take additional fiscal consolidation measures, where warranted, and to strengthen fiscal surveillance. In order to address the severe tensions in financial markets hampering the monetary policy transmission mechanism, the Governing Council of the ECB decided on 10 May to intervene in the euro area public and private debt securities markets to ensure depth and liquidity in dysfunctional market segments.

Highlighting the interconnectedness of the public, financial and private sector balance sheets in a financial crisis, the recent sovereign risk concerns have contributed to renewed tensions in the wholesale funding markets in Europe, as reflected in the spread between three-month LIBOR rates in euro or US dollar and their respective equivalents in overnight index swaps. While this recent rise in the interbank risk premium has been moderate if compared to the extreme levels reached in the aftermath of the failure of Lehman Brothers, the tightening of funding conditions has been broad-based, with indicators gauging conditions in the euro-denominated secured and unsecured interbank market showing a tightening of conditions for term loans and increased difficulties for banks to use some types of collateral in repurchase transactions. Before the re-emergence of these tensions, funding conditions in the interbank and wholesale money markets had shown a significant and gradual improvement in the course of 2009 and the first months of 2010, reflecting the ample liquidity provided by central banks and declining counterparty concerns. Private securitisation markets remained impaired to a large extent, however, and market access to wholesale funding remained difficult for some institutions, notwithstanding the evidence pointing towards a declining use of central bank liquidity facilities and of state-guaranteed bank debt issues.

The financial crisis has resulted in a growth path that is consistent with a significant permanent loss of output and possibly a somewhat lower trend growth relative to the growth path projected before the failure of Lehman Brothers, in particular in the advanced economies. As a result, banks have continued to recognise large amounts of credit losses, which react with some lag to economic developments but are also strongly impacted by a persistence of excess capacity in economies or capital stocks. Yet, generally speaking, bank earnings have improved and capital ratios have been strengthened, including through the raising of capital from private shareholders, during the period under review.

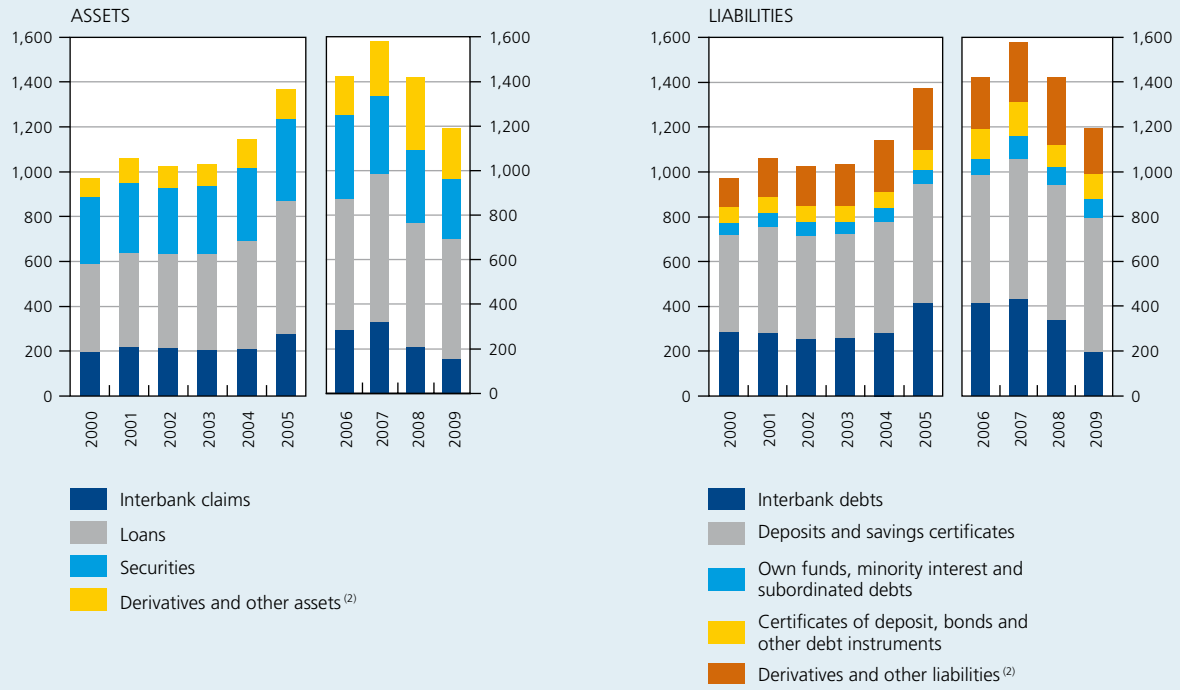
Prior to the intensification of sovereign risk concerns, many asset markets had been characterised by declining volatility, lower risk premiums and rising prices, on the back of improving fundamentals and historically low interest rates. Yet, as demonstrated by the recent developments in government bond, stock and fixed-income markets, asset markets remained very vulnerable to unexpected adverse developments in the real economy, in public finances or in interest rates. As concerns the latter, the current interest rate environment is characterised by historically low interest rates and very steep yield curves, which may induce market participants to increase their exposure to interest rate risk, through higher (unhedged) maturity transformation positions, if not speculative carry trades. As the latter positions are particularly prone to be unwound rapidly in response to a hike in volatility, a large-scale unwinding of such positions could magnify the impact of unanticipated changes in interest rates. It is not excluded that the current highly unusual interest rate environment, combined with the prospective eventual exit from unconventional policy measures, could create market situations like the one experienced in 1994, when the exit from a period of low interest rates in the US to support the financial sector was followed by turbulence in global bond markets.

1.2 Banking sector

Developments in the Belgian banking sector during the period under review continued to bear the marks of the financial crisis, in the form of exceptional losses on financial instruments, a high level of loan impairments and restructuring-related charges or adjustments. An important factor shaping developments in profitability, solvency and balance sheets was the implementation and execution of restructuring plans by the main Belgian bancassurance groups, aimed at addressing the vulnerabilities revealed by the global financial crisis. Last year's Financial Stability Review provided details about the causes of the severe pressures on the profitability and liquidity position of key credit institutions and insurance companies in the Belgian financial system, in the weeks that followed the failure of Lehman Brothers. A description of the government interventions that were required to stabilise market confidence

CHART 2 BREAKDOWN OF ASSETS AND LIABILITIES (1)

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

in the bancassurance groups Fortis, Dexia and KBC, and insurance company Ethias, can be found there as well.

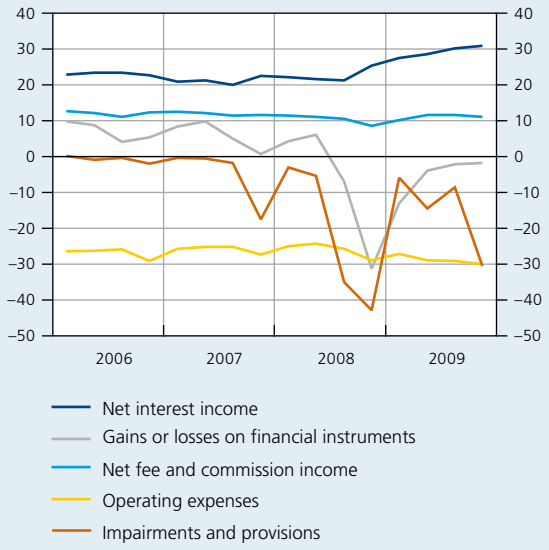
These interventions have been instrumental in stabilising market confidence vis-à-vis systemically important banking and insurance companies in the Belgian financial system, while providing time and resources for the institutions to undertake restructuring plans and refocus their activities on core businesses. Some elements of these ongoing restructuring processes are part of the agreements reached with the European Commission on the remedial measures to be taken in return for the state aid received. The execution of these transformation plans has contributed to a sharp decline in the size of the institutions' total assets and risk-weighted assets in 2009, leading to similar pronounced developments in the related sector aggregates (Chart 2). The refocus of the Belgian banks' business models towards their domestic and certain foreign core clients, together with the fundamental re-evaluation of capital market activities and expansions into non-core markets, has indeed led to the placing into run-off of certain activities and portfolios. The coming quarters are likely to be characterised by further declines in reported total assets, partly as a result of the divestment of a number of subsidiaries, as foreseen in the agreements with the European Commission on the state aid received.

Exceptional crisis-related losses and one-off risk charges related to this major structural reform process have contributed to a second consecutive year of losses for the Belgian banking sector. At 1.2 billion euro, this net loss was however significantly lower than in the *annus horribilis* of 2008, when a loss of 21.2 billion euro had to be recognised. An important challenge for the Belgian banking sector in 2010 and 2011 will be to return to adequate, and sustainable, profitability, which in turn will determine their possibilities to exit from the state capital support measures and to re-establish strong financial positions on a stand-alone basis, without jeopardising their critical financial support functions for the real economy.

Net interest income rose by 3 p.c. in 2009, benefiting from an important increase in the interest margin for the second consecutive year which offset the marked decrease in the volume of interest-bearing assets and

CHART 3 MAIN COMPONENTS OF THE OPERATING INCOME

(percentages of total assets, basis points)

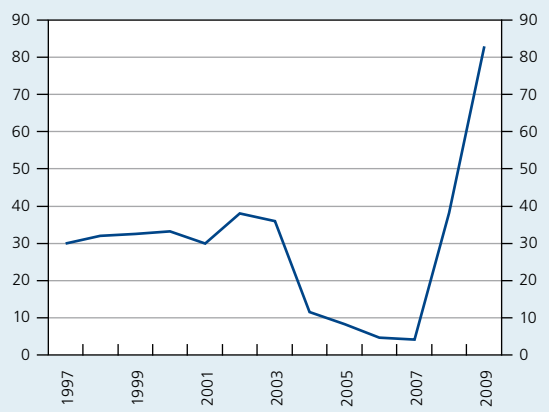


Sources: CBFA, NBB.

liabilities (Chart 3). Non-interest income decreased by 18 p.c, mainly as a result of lower net fee and commission income and exceptional losses recognised by KBC Bank on CDO-related positions in the first quarter of 2009.

CHART 4 LOAN LOSS RATIO (1)

(consolidated data, 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 are the loan loss ratio for the IAS/IFRS category Loans and receivables.

Impairments and provisions also remained an important drag on operating income, as impairments on Loans and receivables climbed to historically high levels. The related loan loss ratio thus reached 83 basis points at the end of 2009, driven mainly by losses on credits outside Belgium (Chart 4). The return to core markets and balance sheet deleveraging has lifted the share of Belgian counterparties in the banking sector's total loans and advances up, from 39 p.c. at the end of 2008, to 47 p.c. last year.

The funding structure of the Belgian banking system has also been rebalanced since the end of 2008, mainly by reducing the reliance on, less stable, wholesale sources of funding within an overall downsized balance sheet. Deposits from credit institutions, which proved to be a major channel of contagion in the aftermath of the failure of Lehman Brothers, have fallen sharply, bringing down to 18 p.c. the relative share of interbank deposits in the total deposits collected and securities issued. The proportion of retail deposits and savings certificates *(kasbons/bons de caisse)* has increased over the same period to 36 p.c. Financing obtained from central banks has declined significantly since the end of 2008, but it remains higher than in June 2008 for an amount of around 30 billion euro.

Belgian banks have also taken steps to increase the stock of financial assets that can be used to generate liquidity. These efforts have focused primarily on increasing the amount of central bank eligible government bonds, securities and loans. Together with the cash holdings, the securities and loans that can be mobilised in repurchase transactions and the other components of the unencumbered liquidity buffer, these liquid assets represented around 20 p.c. of total assets as at the end of 2009.

Competition between banks for stable funding sources, such as bonds and deposits, is expected to rise as new liquidity regulations, including minimum requirements on stable funding ratios, will pressure many banks to try to raise the share of stable funding sources and/or lengthen the duration of their funding. This rebalancing will occur in a context characterised by a gradual exit, by governments and central banks, from some of their funding liquidity support programmes. Yet, medium- to long-term funding possibilities through securitisation are likely to remain impaired for some time to come. An increased competition for stable funding sources is thus likely to lift funding costs in certain maturity segments, further weighing on bank profitability. Costs related to banks' large refinancing needs in the coming two years could also increase as a result of rising government bond yields. Historically high sovereign funding needs – estimated to be around 2.2 trillion euro in 2010 in the European

Union alone – will increasingly start to coincide with rising private sector funding requirements on the back of the economic recovery.

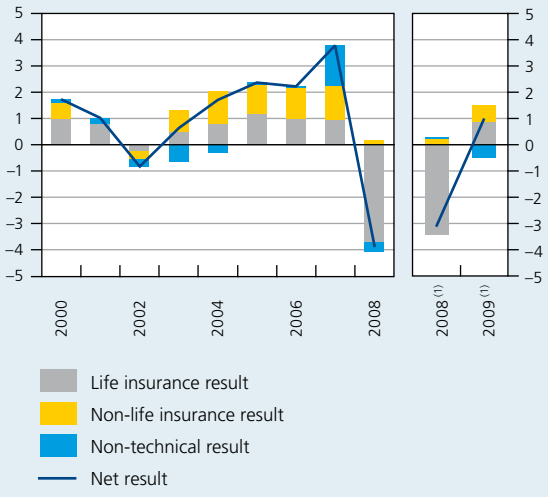
1.3 Insurance sector

While Belgian insurance companies had incurred substantial losses as a result of the severe tensions on the financial markets during the second half of 2008, the increase in financial asset prices during 2009 restored their profitability (Chart 5). Although the increase in the net result of non-life insurance activities contributed to that recovery, the conversion of a 3.9 billion euro loss in 2008 to a small profit of 1.0 billion in 2009 mainly reflects the return to profitability in the life insurance segment.

With corporate bonds and government bonds representing respectively 50 p.c. and 28 p.c. of the investment portfolio covering the liabilities vis-à-vis policyholders in life insurance, market risk exposure in this insurance activity is concentrated on fixed-income instruments, making the sector vulnerable to interest rate fluctuations and to changes in credit and liquidity risk premiums. This great sensitivity to fluctuations in fixed-income product prices led to wide variations being recorded in the difference between the book value and the market value of the overall investment portfolio of the Belgian insurance sector.

CHART 5 NET RESULTS OF THE INSURANCE SECTOR

(unconsolidated data, billion euro)



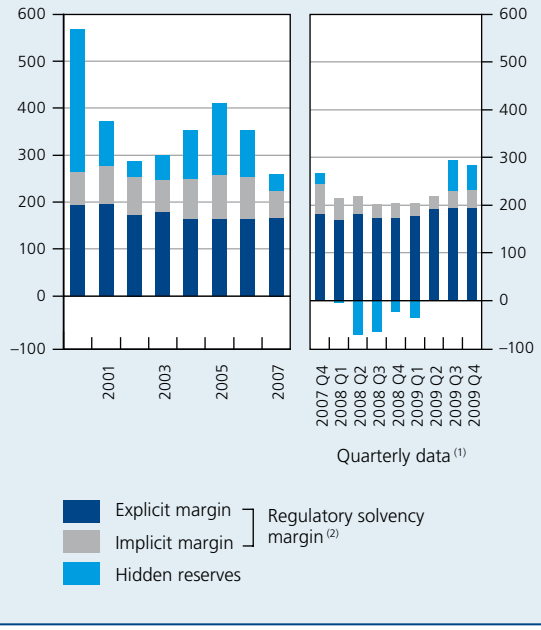
Sources: CBFA, NBB.

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

At the end of the third quarter of 2008, two weeks after the collapse of Lehman Brothers, Belgian insurance companies were recording 5.8 billion euro of unrealised losses on their bond portfolios. In the third quarter of 2009, the difference between the market value and the book value of these bonds returned to a positive figure of 4.3 billion, before declining to 3.1 billion at the end of the year. That increase also helped to improve the implicit solvency margin of insurance companies (Chart 6). The required solvency margin comprises an explicit margin which includes own funds, subordinated debts and certain other balance sheet items, and an implicit margin which, subject to the approval of the supervisory authority (CBFA), comprises certain specific elements, the main one being a part of the unrealised gains on investment portfolios. As the explicit margin had to absorb – via a reduction in the capital reserves – the 3.9 billion net loss incurred by the sector in 2008, a number of companies strengthened their capital in 2008 and in the first half of 2009. That increase enabled the sector to maintain an explicit solvency margin at least equal to 165 p.c. of the required minimum for each quarter from the end of 2007,

CHART 6 SOLVENCY MARGIN OF BELGIAN INSURANCE COMPANIES

(unconsolidated data, percentages of the minimum required margin)



Sources: CBFA, NBB.

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

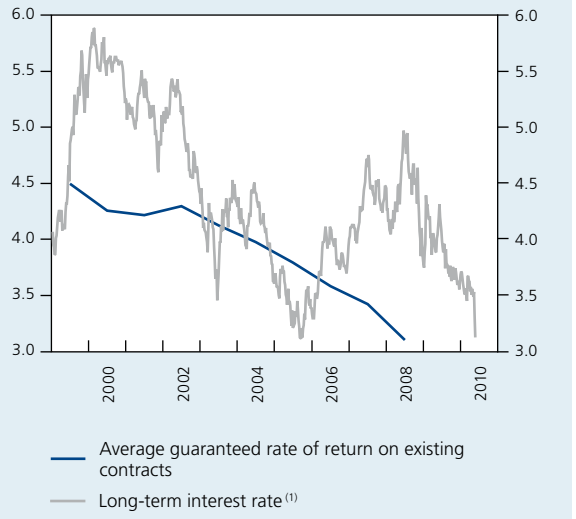
(2) This margin is composed of an explicit margin – including the own funds, subordinated debts and certain other balance sheet items – and an implicit margin which, subject to the approval of the CBFA, comprises certain other specific elements, the principal one being a part of the unrealised gains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

with a level of more than 195 p.c. being attained in the second half of 2009.

In parallel with the decline in unrealised gains on the investment portfolio, the relative size of the implicit margin in the required solvency margin diminished throughout 2008, and in the first quarter of the year under review. If account is taken of all unrealised gains or losses – including those that are not included by the CBFA as part of the implicit margin, in which case they form a hidden reserve – it is evident that the additional solvency reserve due to the difference between the market value and the book value of the investment portfolio remained almost constantly negative from the second quarter of 2008 to the first quarter of 2009. The sum of the implicit margin and the hidden reserve then became positive again, thanks to the aforesaid increase in prices of financial assets, especially fixed-income securities.

The decline in investment returns affected not only the insurance sector's financial statements and solvency in the broad sense, but also the level of life insurance premium income. During 2009, the total of those premiums was 5.5 p.c. down against 2008. That was due to a waning risk appetite among investors, in view of the uncertainty prevailing on the markets in 2009. That environment probably also induced customers to prefer policies offering a guaranteed rate of return (class 21). The level of those guaranteed returns is a particularly important parameter for insurance companies when interest rates on risk-free products slump to very low levels, as they did in the period under review. In fact, such a development is liable to erode the profitability of some guaranteed yield contracts, as happened a few years ago when the returns promised on risk-free investments had fallen well below the statutory ceiling on the 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 modified that adverse structure by marketing contracts offering guaranteed yields which are more in line with risk-free interest rates and containing clauses which provide for revision on the basis of changing market conditions. These measures contributed to a reduction in the average guaranteed rate of return on class 21 contracts from 4.5 p.c. in 1999 to 3.1 p.c. in 2008 (Chart 7).

CHART 7 LONG-TERM INTEREST RATE AND GUARANTEED RATE OF RETURN ON CLASS 21 CONTRACTS



Sources: Thomson Reuters Datastream, CBFA, NBB.
(1) Yield on the secondary market in ten-year Belgian government loans (OLOs).

2. Oversight of financial infrastructure

2.1 Overview of the NBB's oversight activities for 2009

The NBB oversees a wide variety of infrastructures: large-value payment systems, securities settlement systems (SSS), central counterparties (CCP), retail payment systems, payment card systems, e-money schemes and their operators and one message provider. Part of this oversight activity has been built on international cooperative arrangements. For SWIFT, the NBB is lead overseer with the support of the G10 central banks. For Euroclear, the NBB and the Belgian prudential supervisor, the CBFA, coordinate the oversight/supervision of Euroclear SA (ESA) which involves the authorities of the foreign central securities depositories (CSDs) of the Euroclear group. With the further integration of the Euroclear Settlement for Euronext-zone Securities (ESES) platform, the three CSDs Euroclear France, Euroclear Netherlands and Euroclear Belgium in the frame of the authorities concerned have decided to step up a specific cooperation framework which complements the agreement aleady made in the framework of ESA. For oversight of payment card schemes and TARGET2, specific cooperative arrangements have been set up within the Eurosystem.

Concerning the oversight of the Euroclear International CSD (ICSD) system, particular attention has been paid to the risk mitigation measures in place on the link between the Euroclear Bank and Clearstream Banking Luxembourg (the so-called "Bridge"), as well as to the adequacy of the Euroclear Bank's liquidity management, especially under stress circumstances. For the cooperative oversight

of Euroclear SA, monitoring of the strategic programmes is still one of the main priorities for the regulators, with a specific focus on the outsourcing arrangements put in place by Euroclear for the development of these projects. The Euroclear group risk management arrangements have also been reviewed. The more specific ESES oversight and supervisory activities included an initial joint assessment of the ESES securities settlement systems' compliance with the ESCB-CESR recommendations for SSS.

Substantial progress has been made in the oversight assessment of the Belgian card payment scheme Bancontact-Mister Cash. The NBB has also started to coordinate the work of the cooperative assessment group in charge of assessing MasterCard Europe and has been involved in the assessment group devoted to Visa Europe.

With respect to the international messaging service provider SWIFT, one of the major points of attention in the oversight activities was the monitoring of the distributed architecture project which involves setting up a multi-zonal messaging architecture. Aspects reviewed included the resilience features of this new architecture and the organisation of project management. Other areas of specific SWIFT oversight attention included cyber defence, IT audit activities, security risk management and SWIFT's cost management programme.

2.2 Liquidity risk management: the perspective of overseers of financial market infrastructures (FMIs)

Following the financial crisis, liquidity risk has become a top priority on the regulators' agenda. Sound liquidity management in particular has proved to be a basic element of the smooth functioning of the financial market infrastructures (FMIs). While many banks participating in FMIs faced liquidity shortages during the crisis, generally the FMIs themselves did not experience any such shortages.

This can be explained by the fact that liquidity risk in FMIs differs from the liquidity risk in banks, owing to the difference in their activities. Under normal circumstances, FMIs focus their liquidity risk management on the smooth processing of transactions, while under stress conditions they are typically required to be able to withstand events such as the failure of the participant with the highest debit position in the system. By its very nature, the financial crisis has tested participants' confidence in the FMIs. This confidence remained intact, as these participants did not withdraw liquidity from these infrastructures.

The bank supervisors' reaction to the crisis centred on the development of principles for sound liquidity risk management and of metrics determining minimum levels of liquidity for banks. Although the FMIs withstood the liquidity shortage resulting from the crisis relatively well, the overseers still felt it appropriate to launch a comprehensive review of existing standards governing liquidity risk for FMIs. This review is part of the ongoing revision of FMI standards recently launched by CPSS-IOSCO.

2.3 Assessment and lessons of the operational crisis exercise conducted with Atos Worldline

In October 2004, the Financial Stability Committee (FSC), a coordinating body comprising members of the Board of Directors of the National Bank of Belgium (NBB) and the Banking, Finance and Insurance Commission (CBFA), plus a representative of the Minister of Finance, issued some recommendations on Business Continuity Planning (BCP).

In accordance with those recommendations, the government's first operational crisis exercise with a critical player from the Belgian financial sector took place on 25 September 2009. That exercise involved participants from the NBB, the CBFA, the FSC secretariat, the Ministry of Finance (Treasury) and Atos Worldline S.A. (AWL), formerly Banksys, a company operating electronic payment systems (debit cards, credit cards, etc.).

The exercise was based on a scenario in which electronic payment systems run by AWL were out of action. The non-availability of debit and credit card payments triggered activation of the escalation procedure and implementation of the "Banknote emergency plan" planned by the FSC.

This was the first complete test of the FSC's escalation procedure. It confirmed that there was efficient coordination and an appropriate response by both AWL and the staff of the NBB, the CBFA and the FSC involved in the test. The exercise also demonstrated the participants' awareness of the FSC's operational crisis procedures, the operational readiness of the crisis facilities and the importance of speedy, concerted communication. In addition, the exercise revealed the benefits of having a small, flexible entity responsible for permanently monitoring the crisis as it unfolds.

Finally, the September 2009 exercise showed that it would be useful to plan other fairly large-scale crisis exercises, either with the Crisis Centre or with the police or other critical players, in order to perfect the mastery of the

FSC crisis procedures and promote contact between the various participants.

3. Thematic articles

3.1 Building a more stable financial system : regulatory reform in a post-crisis perspective

The events of the crisis have resulted in a sea change in the mindset, views, and focus of financial authorities, leading to what may be described as a new regulatory and supervisory culture. As a result, a number of regulatory reforms have been proposed or are being formulated and, if implemented, are likely to have far-reaching consequences for the financial sector. The reforms touch on all of the key areas relating to the maintenance of financial stability – supervision, regulation, and crisis management – reflecting a holistic response to the weaknesses exposed by the crisis.

This article focuses on the proposed reforms in the areas of banking regulation and crisis management. In particular, it discusses the relation between the evolving, post-crisis consensus and proposed reforms of the Basel II framework that have been put forward by the Basel Committee on Banking Supervision. In addition, while the proposed changes to banking regulation aim to strengthen the resilience of financial institutions and to avoid a future crisis, efforts are also needed to improve authorities' ability to effectively deal with distressed financial institutions or resolve a crisis when it occurs. A number of critical reforms to crisis management and resolution frameworks are thus discussed in this context.

While many reform proposals have been put forth to date, the details and the ultimate reform package have not yet been decided. Essential quantitative and qualitative analyses of the potential impacts of the proposed reforms, both individually and collectively, are ongoing. The goal will be to achieve a level of true reform in the financial sector that the crisis has revealed to be essential, while avoiding harmful effects and unintended consequences that could ultimately undermine the new measures.

3.2 Measuring the systemic importance of financial institutions using market information

The recent crisis has shifted the focus from the assessment of the resilience of individual financial institutions towards a more systemic approach. In this context, mitigating the risk stemming from so-called systemically important institutions has been identified as an important policy item. In particular, consideration is currently being given in a number of jurisdictions to the possibility of applying special policies, such as a tax or capital surcharge, to systemically important institutions. Yet, a crucial step in macro-prudential supervision and regulation aimed at reducing the risk of systemically important institutions is to identify which institutions are in fact systemically important. However, this is not a straightforward task, and the existing proposals on the matter still seem far from having developed the ideal measure of systemic importance.

This article discusses the concept of systemic importance and identifies some specific issues that need to be taken into consideration when designing a measure of systemic importance. We argue that, although systemic risk and systemic importance have some similarities, they are distinct concepts that differ in their defining aspects and drivers. In order to properly measure the systemic importance of a financial institution, the measure must concentrate on the institution's potential impact on the system in the event of failure or distress, which largely boils down to capturing the spillover or contagion effects from the institution in question to the rest of the system. This may entail separating spillover or contagion effects from the effects of a systematic shock through common exposures, as well as identifying cascade or domino effects.

Finally, the article provides an assessment of existing measures of systemic importance based on market information against the proposed conceptual background. We find that none of the proposed measures seems to actually succeed in precisely identifying the impact on the system of the failure or distress of an individual financial institution.

3.3 The banking market (jigsaw) puzzle : Would coming closer to a stand-alone subsidiary model automatically lead to cross-border re-fragmentation ?

The recent crisis is a clear illustration of the tension that exists between, on the one hand, the cross-border model of large banks and, on the other hand, the European framework for crisis management, which is still based largely on national powers. The article explores the two possible ways of resolving this tension, and their potential impact in terms of banking market re-fragmentation.

The first would be to reinforce the European framework for crisis prevention and crisis resolution. This may comprise the development of a single rulebook, improvements

in the coordination of micro- and macro-prudential control, a solution to the allocation of crisis management costs and responsibilities and finally, modifications to insolvency laws to recognise the group dimension. Authorities in Europe have started to work on all these very challenging dimensions.

Alternatively, in the absence of a European solution, national authorities may have no choice but to adopt measures that will facilitate crisis resolution at a local level and ensure that, despite the level of integration of a banking group, the survival of local entities does not entirely depend on the strength of the group (the so-called stand-alone subsidiary model). The impact of measures on long-term financial market integration is not necessarily obvious. First, a distinction needs to be made between the integration of financial institutions and the re-fragmentation of financial markets. The fact that financial institutions would be somewhat less integrated would not necessarily put European integration at risk. Second, the cost of these measures may eventually be limited. In addition, in many instances, banks can adapt their behaviour and operations in ways that simultaneously decrease the cost associated with these measures and satisfy the supervisor. Finally, banks still have the option of operating via branches.

Yet, introducing stand-alone measures remains a tricky exercise, requiring authorities currently contemplating such a move to consult all stakeholders in order to achieve the delicate balance between, on the one hand, measures that would contribute towards strengthening the national financial sector and limiting the cost of crisis management to the domestic taxpayer, and, on the other hand, measures that would impose excessive constraints on the financial industry and limit the benefits of market integration.

3.4 In search of timely credit risk indicators : a view of the current crisis from a market-implied ratings perspective

An important challenge for financial policymakers and supervisors to avoid widespread financial distress equal to that experienced in the current crisis is to identify and assess risks to financial stability in an accurate and timely manner. In their search for suitable indicators and in order to obtain a broader assessment of banks' credit risk, financial authorities complement confidential supervisory information with publicly available information, such as long-term ratings provided by rating agencies and market prices (e.g. CDS spreads). However, the events in the current crisis have raised questions about risk indicators.

Market-implied ratings (MIRs) were recently introduced by rating agencies as market-based indicators of credit risk. According to the rating agencies, MIRs offer a timely, accurate and easily interpretable representation of market-based information on the credit quality of the issuer of the rated instrument. In particular, MIRs are claimed to isolate changes in risk for individual issuers from the noise of the markets. From a macro-prudential point of view, it is interesting to ask whether such indicators offer a more precise measure of credit risk than e.g. CDS spreads, and whether information about credit risk is incorporated into one of the market-implied ratings (CDS-implied ratings versus equity-implied ratings) more quickly than in the other or than in market prices (CDS spreads).

This article analyses the behaviour of CDS-implied ratings and equity-implied ratings from a major rating agency as well as CDS spreads for a sample of 30 large European and US banks over a period covering the run-up to the crisis and the crisis period itself. Our analysis suggests that MIRs are unlikely to fully overcome the deficiencies of their underlying components (long-term ratings and market prices). Instead, the changes in MIRs seem to reflect movements in the underlying market prices which appear to be related to factors other than credit risk, such as market liquidity, investors' risk aversion or general market sentiment.

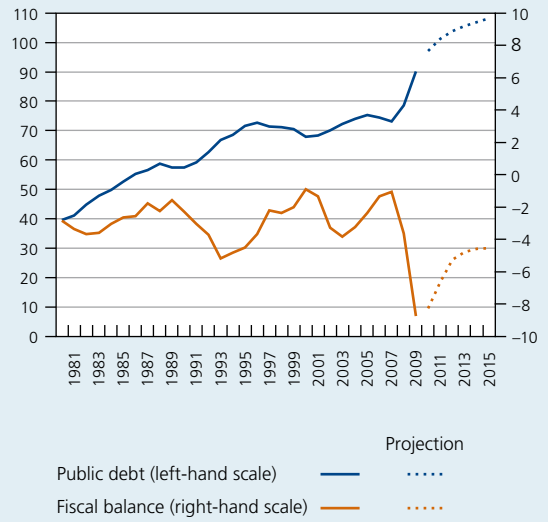
Financial Stability Overview

1. Operating environment

Several years of low financial market volatility, narrow credit and liquidity risk premiums, and generally favourable market conditions for financial institutions came to an abrupt end in the summer of 2007, when higher than expected delinquencies on US subprime mortgage loans set in motion a sequence of events that would lead to the collapse of investment bank Lehman Brothers on 15 September 2008, extraordinary amounts of central bank and government support measures to stabilise the global financial system and, in the most recent period, heightened market concerns about the sustainability of fiscal positions in the advanced economies. These sovereign risk concerns led to turbulence and impaired liquidity in a number of euro area government debt markets and to a reassessment by investors of their appetite for risk-bearing assets more generally, amidst concerns over the consequences of these ongoing developments – at the time of finalising this article – for the global and European economic recovery.

CHART 1 GENERAL GOVERNMENT FISCAL BALANCES AND PUBLIC DEBT IN THE ADVANCED ECONOMIES

(percentages of GDP)



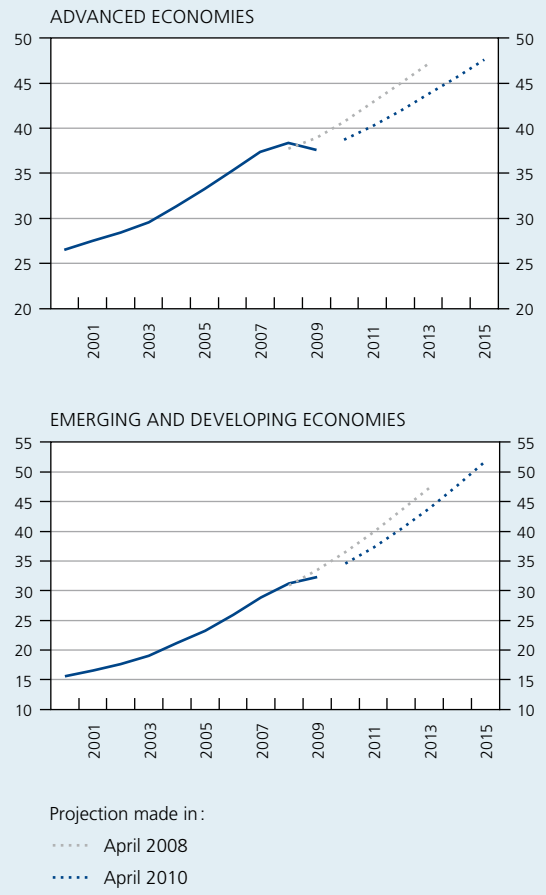
Source: IMF World Economic Outlook (April 2010).

As described in last year's Financial Stability Review, massive support interventions were necessary to prevent a contagious materialisation of counterparty risks and disorderly balance sheet liquidations in the financial system in the aftermath of the failure of Lehman Brothers. According to a recent estimate by the IMF, the amounts pledged in various forms of financial sector support in the G20 advanced economies totalled almost 8000 billion US dollar or around 25 p.c. of the GDP of those countries. While the actual use by financial institutions of capital support facilities, impaired asset relief measures and government guarantees remained well below total pledged amounts – with actual usage showing a tendency to decrease in the second half of 2009 and the first months of 2010 –, the existence of this official safety net has been instrumental in fostering the gradual recovery of the global financial system from the very tense conditions prevailing in the last quarter of 2008 and the first quarter of 2009.

Some of these support measures contributed directly to the sharp deterioration in general government fiscal balances and public debt ratios in 2008 and 2009. Yet, they were not the main reason for the emergence, in the advanced economies as a whole, of an average fiscal deficit in excess of 8 p.c. of GDP in 2009 and a rise in public debt of almost 17 p.c. of the combined GDP of the advanced economies between the end of 2007 and the end of 2009 (Chart 1).

CHART 2 GROSS DOMESTIC PRODUCT

(billion US dollar, based on purchasing-power-parity valuation)



Source: IMF World Economic Outlook (April 2008 and April 2010).

These developments were due more to the sharp contraction of economic activity after the failure of Lehman Brothers, affecting in turn the general government accounts through the operation of automatic stabilisers and the implementation of discretionary fiscal stimulus measures. In a number of European countries, the effect of the financial crisis on economic growth was magnified by homegrown vulnerabilities stemming from a previous rapid expansion of credit to the private sector and real estate booms.

To the extent that the financial crisis may result in a growth path that is consistent with a significant permanent loss of output and possibly a somewhat lower trend growth relative to the growth path projected before the intensification of the financial crisis in the autumn of 2008 (Chart 2), some of the observed deterioration in the fiscal positions will be less easily reversed than in the case of previous economic downturns.

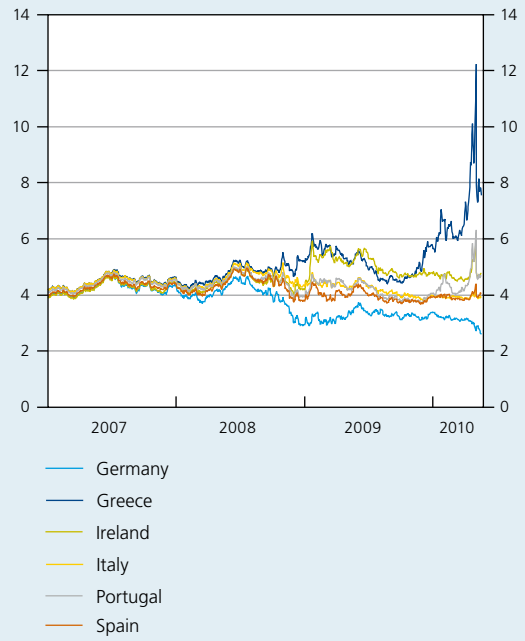
The emergence of large deficits can also be explained by the fact that structural fiscal positions and economic performance in a number of countries had been weak or weakening before the intensification of the financial crisis in the second half of 2008, including as a result of imbalances that had built up in previous years.

Against this backdrop, market attention thus shifted in the first months of 2010 to the sustainability of public finances in developed economies and to sovereign risk as a potential channel for new instability in the global financial system. The most direct consequence of these increased sovereign risk concerns was a sharp differentiation in the borrowing costs of various sovereigns in the euro area, with Greece, Portugal and Ireland seeing the most dramatic increases in ten-year government bond yields relative to the German ten-year benchmark (Chart 3).

Markets focused in particular on developments in Greece, where the government's revelation of previous fiscal misreporting led to significant upward revisions of the fiscal deficit and public debt figures, and market concerns over the political will and capacity to implement the fiscal and structural reforms necessary to place Greece's public finances on a sustainable path.

CHART 3 TEN-YEAR GOVERNMENT BOND YIELDS

(percentages)



Source: Thomson Reuters Datastream.

In October 2009, Fitch downgraded Greece's sovereign rating one notch on account of growing doubts over the fiscal and competitive position, following the announcement that the 2009 budget shortfall would be 12.5 p.c. of GDP, much higher than Fitch's expectation and the previous government's target of 3.7 p.c. Subsequent sovereign rating downgrades on the back of concerns over the medium-term outlook for public finances led to downgrades of Greek financial institutions. These spill-over effects called for bold action by the Greek government, which announced a first fiscal austerity package on 3 March. However, as this package was insufficient to calm market concerns over a potential need for debt restructuring, Greece announced a new fiscal austerity programme on 2 May, in which it would shrink its budget deficit from 13.6 p.c. in 2010 to below 3 p.c. in 2014. On the same day, the Finance Ministers of the euro area, together with the IMF, announced a package of emergency loans for Greece that could be increased to 110 billion euro, of which 80 billion was financed by euro area countries. On 3 May, the ECB announced that it was suspending the minimum credit rating required for Greek government-backed assets used in ECB liquidity-providing operations.

Yet, the announcement of this 110 billion euro support package for Greece did not significantly allay market concerns over the sustainability of Greece's fiscal position, as doubts persisted about whether the Greek authorities would be able to deliver on the large fiscal adjustments required. The Greek support programme also failed to prevent a further intensification of tensions in other peripheral government bond markets, raising the spectre of potential contagion from the Greek debt crisis spreading to other countries, and to the euro area financial system in general. Towards the end of the week of 3 May, spreads versus German government bonds reached record levels in some peripheral government bond markets, where liquidity was becoming significantly impaired as a result of these contagion fears.

In view of these developments, the EU Council agreed on 9 May to establish a European Financial Stabilisation Mechanism (EFSM), alongside commitments to take additional fiscal consolidation measures, where warranted, and to strengthen fiscal surveillance mechanisms. This EFSM will have at its disposal up to 500 billion euro of financial resources provided by Member States to safeguard financial stability in the euro area. There will be strict conditions governing its activation, in the context of joint EU/IMF support, similar to the terms and conditions applicable to IMF financing programmes. The IMF is expected to participate in potential future financing arrangements, providing at least half as much as the EFSM contribution. The total 500 billion euro will consist of an extended EU facility (60 billion) and a Special Purpose Vehicle (440 billion) whose borrowing will be guaranteed pro rata by participating Member States.

In order to address the severe tensions in financial markets hampering the monetary policy transmission mechanism, the Governing Council of the ECB decided on 10 May to intervene in the euro area public and private debt securities markets to ensure depth and liquidity in dysfunctional market segments. Other measures taken by the ECB to restore more normal market conditions included the adoption of a fixed-rate tender procedure with full allotment in the regular three-month longer-term refinancing operations (LTRO) to be allotted on 26 May and on 30 June 2010, in addition to a six-month LTRO with full allotment on 12 May 2010, and the reactivation, in coordination with other central banks, of liquidity swap lines with the Federal Reserve.

These liquidity swaps between the ECB and the Federal Reserve, in combination with US dollar-liquidity-providing operations by the ECB to euro area banks, had been instrumental in alleviating dollar funding stresses in the euro area banking system during the very severe liquidity crisis of 2008. The recent sovereign risk concerns have contributed to renewed tensions in the wholesale funding markets in Europe, as reflected in the increase in the spread between three-month LIBOR rates in euro

CHART 4 SPREAD BETWEEN INTERBANK AND OVERNIGHT INDEX SWAP RATES[1]

(percentages)

Source: Thomson Reuters Datastream.

(1) Spread between three-month Libor and three-month fixed rate paid by the counterparty of an interest rate swap receiving the overnight rate for a three-month term.

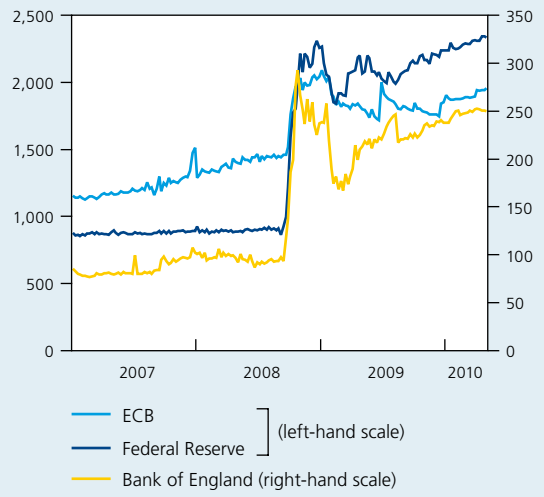
or US dollar and their respective equivalents in overnight index swaps (Chart 4). While this recent rise in the interbank risk premium has been moderate if compared to the extreme levels reached in the aftermath of the failure of Lehman Brothers, the tightening of funding conditions has been broad-based, with indicators gauging conditions in the euro-denominated secured and unsecured interbank market showing a tightening of conditions for term loans and increased difficulties for banks to use some types of collateral in repurchase transactions.

Before the re-emergence of these recent tensions, funding conditions in the interbank and wholesale money markets had shown a significant and gradual improvement in the course of 2009 and in the first months of 2010, thanks to the ample liquidity provided by central banks (Chart 5) and declining counterparty concerns in the interbank market. In response to the freezing of almost all segments of the interbank and wholesale finance markets in October and November 2008, and the resulting severe pressure on the liquidity positions of financial institutions, central banks then implemented various support measures for the financial system. They cut their key interest rates to historically low levels, lengthened the terms of their loans to financial institutions, extended the range of financial assets qualifying as collateral for their operations, supplied liquidity in foreign currencies, and adopted quantitative easing policies to inject liquidity into key sectors of the financial system.

Central banks, whose balance sheets are at record levels, are now in the process of winding down some of these emergency liquidity schemes. The Federal Reserve has closed programmes such as the Money Market Investor Funding Facility on 30 October 2009, and the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, the Commercial Paper Funding Facility, the Primary Dealer Credit Facility and the Term Securities Lending Facility on 1 February 2010. The Term Asset-Backed Securities Loan Facility (TALF) has been extended until the end of June 2010 for loans collateralised by newly issued commercial mortgages. Before announcing the new measures on 10 May, the ECB had enacted a gradual phasing out of non-standard measures through the reduction of longer-term refinancing operations (LTRO). Yet, the minimum credit threshold for marketable and non-marketable assets in the Eurosystem collateral framework was maintained at investment-grade level (i.e. BBB–/Baa3) beyond the end of 2010, except in the case of asset-backed securities, with the application, as of 1 January 2011, of a schedule of graduated valuation haircuts to the assets rated in the BBB+ to BBB– range (or equivalent). This graduated haircut schedule will replace the uniform haircut add-on of 5 p.c. that is currently

CHART 5 CENTRAL BANK ASSETS

(billion of domestic currency)



Sources: Bank of England, ECB and Federal Reserve.

applied to these assets. The Eurosystem's interventions in the covered bond markets, through the acquisition of a 60 billion euro portfolio in support of bank lending to the real economy, are scheduled to end in June 2010, when the largest one-year LTRO conducted in 2009 (for a total amount of 442 billion euro) will also come to maturity.

The gradual phasing out of extraordinary central bank support measures is likely to affect the funding conditions for the global banking system. Notwithstanding the evidence pointing towards a declining use of central bank facilities and of state guarantees on banks' debt issues, market access to wholesale funding has indeed remained difficult for some institutions. More generally, competition between banks for stable funding sources, such as bonds and deposits, is expected to rise as new liquidity regulations, including minimum requirements for stable funding ratios, are likely to prompt many banks to try to lengthen the duration of their funding, and since there is a risk that the medium- to long-term funding possibilities offered by securitisation will remain impaired for some time to come. While long-term funding is generally more expensive than short-term funding, this increased competition for stable funding sources is likely to lift funding costs in certain maturity segments, weighing on bank profitability. Costs related to banks' substantial refinancing needs in the coming two years could also increase as a result of rising government bond yields. Historically high sovereign funding needs – estimated to be around 2.2 trillion euro in 2010 in the European Union alone – will increasingly

start to coincide with rising private sector funding requirements on the back of the economic recovery. The resulting potential upward pressures on sovereign borrowing costs – which usually constitute the basis for pricing other borrowers' debtor rates – could be magnified in those countries where the sovereign cost of funding has been affected by elevated sovereign credit risk spreads.

CHART 6 MONETARY POLICY AND MARKET INTEREST RATES IN THE US AND THE EURO AREA

(percentages)

Source: Thomson Reuters Datastream.
(1) One-month standard deviation of daily yield changes.

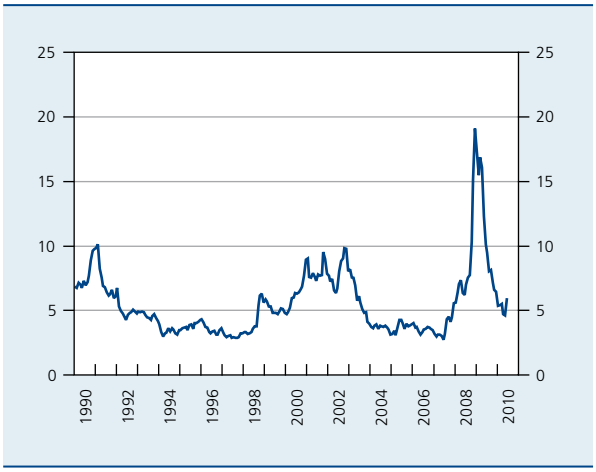
So far, in order to maintain their support to the financial sector and the real economy, central banks have kept their policy rates at historically low levels (Chart 6). In the euro area, the main refinancing rate currently stands at 1 p.c. In the US, the target for the federal funds rate was brought down to an interval between 0 p.c. and 0.25 p.c. In both the US and the euro area, three-month interbank rates and benchmark ten-year government bond yields dropped to historically low levels and the yield curves became considerably steeper. At the end of 2009, the difference between the benchmark ten-year government bond yield and the three-month interbank rate amounted to 275 basis points in the euro area and 350 basis points in the US. This spread has gradually tightened again in 2010, as rising risk aversion in global financial markets and increased differentiation in the pricing of sovereign risks within the euro area contributed to new declines in the long-term German and US government bond yields. While this development was associated with an uptick in interest rate volatility, volatility remained well below the levels recorded at the end of 2008 and in the first quarter of 2009, and much below the volatilities experienced in the government bond markets of some peripheral euro area countries.

The presence of still steep yield curves may induce market participants to increase their exposure to interest rate risk, through higher (unhedged) maturity transformation positions, if not speculative carry trades. As the latter positions are particularly prone to be unwound rapidly in response to a hike in volatility, a large-scale unwinding of such positions could magnify the impact of unanticipated changes in interest rates. It can be noted, in this connection, that the current highly unusual interest rate environment of historically low interest rates and the eventual exit from unconventional policy measures could create market situations like the one experienced in 1994, when the exit from a period of low interest rates in the US to support the financial sector was followed by turbulence in global bond markets.

Up until recently, conditions in other fixed-income markets had been characterised by sharp declines in risk premiums, resulting in a return of spreads over risk-free yields to levels in line with (or even below those) recorded during previous periods of stress, but well below the unprecedented levels recorded in the autumn of 2008 (Chart 7). This development was fostered by the better-than-expected recovery of the real economy, which also contributed to rising equity prices and declines in measures of implied

CHART 7 US HIGH-YIELD BOND SPREAD (1)

(percentages)



Source: Thomson Reuters Datastream.

(1) 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.

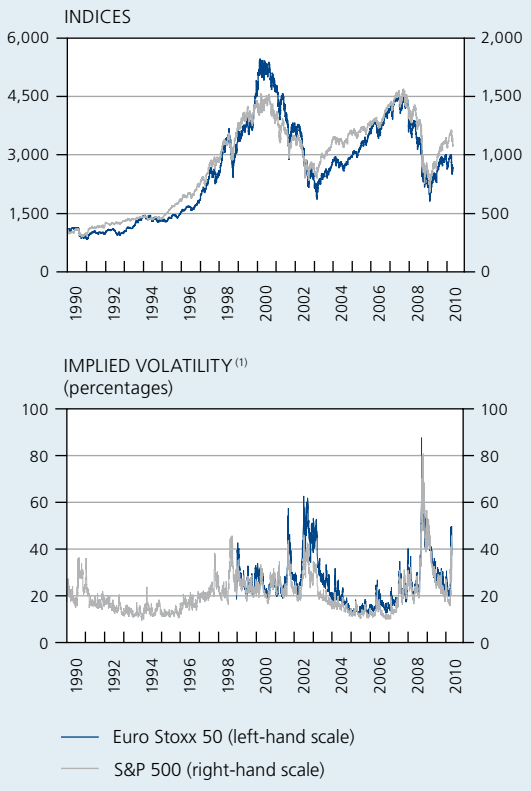
volatility on those markets up to the end of April 2010 (Chart 8). While global economic activity is estimated to have contracted by 0.5 p.c. in 2009, IMF Staff projected, in early April 2010, global economic growth to accelerate to 4.25 p.c. in 2010 and 2011, in line with the average annual expansion rate enjoyed by the world economy in the five years before 2007. Yet, the Staff then already cautioned that the recovery was expected to proceed at varying speeds, with expansion in the advanced economies being held back by weakened financial and private sector balance sheets as a result of the financial crisis. The outlook for the emerging and developing economies was for significantly stronger growth while growth in Europe was expected to remain very moderate over the next two years. Given recent developments, market analysts expect that accelerated fiscal consolidation in a number of euro area countries could further dent growth performances. These growth concerns were a main cause of the sharp falls on global stock markets in the course of May, which also contributed to a new spike in the levels of implied volatility.

To the extent that improved economic conditions and (re)financing possibilities on the corporate bond markets lowered risks of corporate distress, rating agencies revised downwards their forecasts for corporate bond defaults. Moody's global default rate on speculative-grade corporate bonds had risen from less than 1 p.c. at the end of 2007 to 4.4 p.c. at the end of 2008 and 13.0 p.c. at the end of 2009, a level surpassing that of previous peaks in 1991 and 2002. It had already fallen below 10 p.c. in April 2010, staying well below the record highs of the Great Depression, with expectations that the global high-yield default rate will gradually decline further to 3.3 p.c. by year-end 2010 in the baseline case, and to 7.0 p.c. in a more pessimistic scenario. For investment-grade corporate issuers, the default rate had risen from 2.0 p.c. at the end of 2008 to 5.4 p.c. at the end of 2009, and is expected to fall throughout 2010. The improvements in the real economy have also reduced the deterioration of forward-looking credit indicators, such as rating downgrade-to-upgrade ratios, which fell from 18.3 in the first quarter of 2009, the highest in 27 years, to 1.8 in the fourth quarter of 2009.

Notwithstanding both economic and credit fundamentals improving, euro area corporates remain vulnerable to shocks to their revenues and financing costs. Euro area corporates are relatively highly leveraged and report moderate, albeit improving, profitability. Whereas the rebound in corporate profitability throughout 2009 resulted to a large extent from cost-cutting measures, earnings growth in 2010 is expected to benefit more from the

CHART 8 STOCK MARKETS

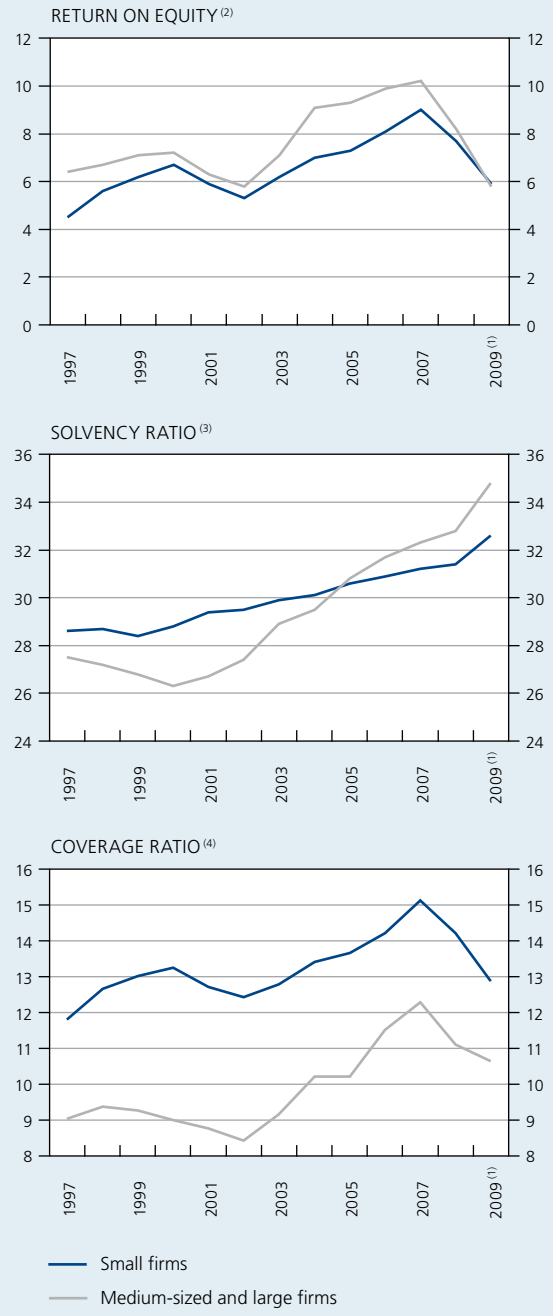
(index levels, unless otherwise stated)



Source: Thomson Reuters Datastream.

(1) Based on the volatility implied in S&P 500 and Euro Stoxx 50 options.

CHART 9 MEDIAN PROFITABILITY AND SOLVENCY INDICATORS FOR BELGIAN NON-FINANCIAL CORPORATIONS



Source : NBB.

(1) The medians in 2009 are calculated by applying to the 2008 medians the percentage change 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.

improvement in macro-economic conditions. Given the current shape of the recovery path, earnings growth is, however, expected to remain moderate in 2010, even in the event of a contained spill-over of recent market developments on the real economy.

Chart 9 shows recent developments in the profitability and solvency of the Belgian non-financial corporations, on the basis of the 2009 accounts already available for a sample of the whole population of non-financial corporations in the Central Balance Sheet Register. The median solvency ratio, which measures own funds as a percentage of the balance sheet total, is estimated to have risen further in 2009, to respectively 32.6 p.c. and 34.8 p.c. for small firms and medium-sized or large firms. This development during a recession year is attributable partly to the continuing effect of the introduction of a more favourable fiscal regime for own funds in 2006. (1) The increase in the outstanding amount of own funds has contributed to the decline in the median return on equity, which remained positive nonetheless for the median companies. As a large number of companies in the sample have an accounting year that does not coincide with the calendar year, the 2009 accounts used in the calculations for Chart 9 may not reflect the full impact of the weak economic conditions that prevailed throughout 2009. The coverage ratio, which expresses the extent to which debts and provisions are covered by cash flows, has continued its decline from the peaks reached in 2007, but has remained at a substantially higher level than in 2002 and 2003, when the previous credit cycle downturn occurred.

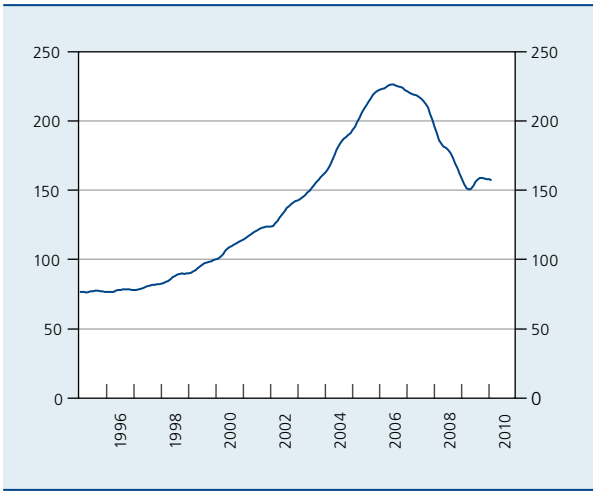
The US housing market, which was the initial trigger for the financial crisis through the higher than expected defaults on subprime mortgage loans impacting on the value of structured credit instruments with these loans as collateral, has shown some signs of stabilisation, with house prices recovering slightly from the lows recorded in the first half of 2009 (Chart 10). They remain around 30 p.c. below the peak reached in the summer of 2006, however, leaving many US households with negative home equity.

In Europe, housing market developments have been quite disparate during the crisis, with several countries recording falls in average house prices (Chart 11). These price falls were mainly concentrated in those countries where the period 1999-2006 had been characterised by comparatively high rates of house price inflation, such as Ireland, Spain, France, and to a more limited extent, the Netherlands. In Spain and Ireland, house price deflation is

(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 10 US HOUSE PRICES (1)

(index)



Source: Thomson Reuters Datastream.
(1) S&P / Case Shiller home price index for 10 cities.

part of a broader adjustment process of unwinding excessive residential real estate investments in previous years. In the other countries, there are fewer signs of excess so far. This is also the case for Belgium, where several years of strong momentum in the mortgage and residential real estate market gave way to a slowdown in the second half of 2008, in relation with the impact of the failure of Lehman Brothers on overall economic activity and confidence indicators. This slowdown led to a marginal decline in the average size of new mortgage loans in the first half of 2009, before recovering again to the levels recorded in the summer of 2008. At the margin, the increasing popularity of variable rate mortgages (with low initial interest rates) during this period may have contributed to this development.

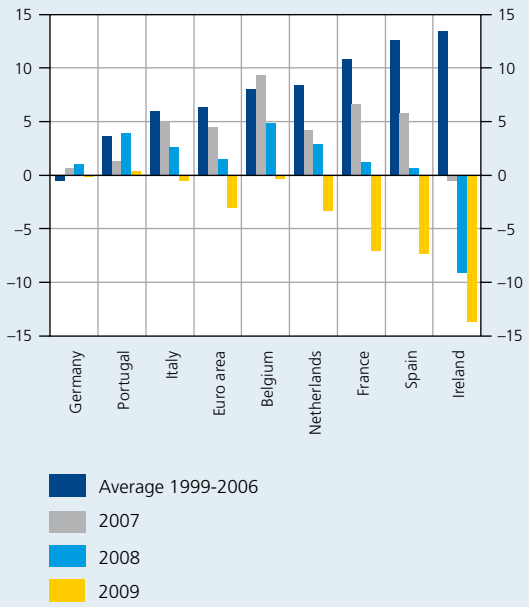
Prices of commercial real estate have fallen in all euro area countries, and in most cases significantly more than prices of residential real estate, in particular in countries where the financial sector is highly exposed, such as Ireland. The Irish agency created to purchase bad real estate loans from banks announced that it would apply an average discount of 47 p.c. for the acquisition of 16 billion euro of bad loans in a first tranche. Irish banks therefore had a reportedly 32 billion euro capital shortfall, as the Irish banking regulator revealed on 30 March. The labour market situation plays a critical role in developments in real estate markets. If unemployment rises by more than expected, credit losses on both direct and indirect real estate exposure can increase. Unemployment is expected to rise further in 2010, with the risk that it may remain high for longer than expected.

The slump in prices of highly-rated structured credit instruments backed by US residential or commercial mortgages had caused havoc at many financial institutions, which had to recognise large marked-to-market losses on even the most senior tranches. That price fall has also bottomed out, thanks to a combination of government measures such as liquidity support to investors in structured product markets under the TALF, or the direct purchase of mortgage-backed securities by the Federal Reserve, and improvements in market conditions on the back of the upturn in the real economy, the housing market and low interest rates. However, some pockets of vulnerability may remain in the financial system due to losses on structured products, that either remain to be recognised or that could materialise in the case of a new deterioration in underlying assets such as commercial real estate.

The developments in financial markets and the real economy have led to downward revisions of the estimated writedowns for financial institutions. In its most recent Global Financial Stability Report, the IMF revised down to 2300 billion US dollar its estimates for total losses on loans and securities holdings for banks in the period between 2007 and 2010, from an earlier estimate of 2800 billion. For euro area banks, estimated total losses for bank loans have fallen to 442 billion US dollar.

CHART 11 NOMINAL HOUSE PRICE DEVELOPMENTS IN THE EURO AREA

(annual percentage changes)



Sources: ECB, FPS Economy.

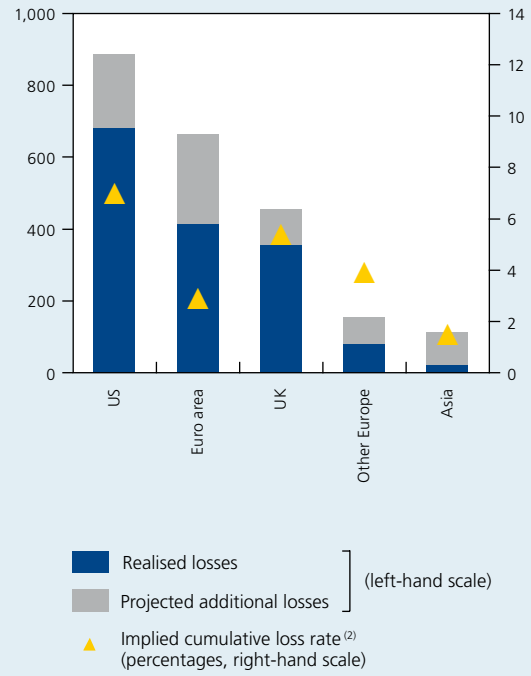
Projected total writedowns on securities held by euro area banks were lowered to 224 billion US dollar. The combined 665 billion loss is equivalent to a cumulative loss rate of 2.9 p.c. (Chart 12). The IMF estimates that about one third of this total remains to be recognised. Yet, as bank earnings have improved and capital ratios have been strengthened – including through the raising of capital from private shareholders – during the period under review, the global banking system is now better placed to cope with these projected losses than was the case in the last quarter of 2008 and the first quarter of 2009, when large government-led recapitalisations of credit institutions had proved necessary to pull back the banking system from the brink.

Given the revealed interconnectedness of the public, financial and private sector balance sheets in a financial crisis, the many reforms that are being envisaged to prevent a repetition of the global financial crisis include some which aim to sever the links between public sector and financial sector balance sheets by the development of national and international procedures for resolving bank failures in a more orderly way and without having to spend large amounts of public funds on institutions deemed to be too large or too interconnected to fail. Such measures could help to reduce the systemic repercussions of the failure of a large bank or one closely interconnected with other institutions. That same concern subtends the request to systemically important banks to develop structures and forms of organisation facilitating the dismantling of institutions, or their division into more homogeneous entities, in the event of serious financial difficulties.

In Belgium, a law was voted by parliament, aiming to extend the government's power to intervene if a credit institution, insurance company, settlement institution or institution equivalent to settlement institutions faces problems which threaten the stability of the financial system (Box 1).

CHART 12 REALISED AND PROJECTED ADDITIONAL LOSSES ON LOANS AND SECURITIES HOLDINGS FOR BANKS IN 2007-2010 (1)

(billion US dollar, unless otherwise stated)



Source : IMF Global Financial Stability Report (April 2010).

(1) Projections by IMF Staff of cumulative losses on holdings of securities and loans in the banking sectors of the respective countries and regions.

(2) The implied cumulative loss rate expresses the expected cumulative losses on holdings of securities and loans relative to the outstanding amount of these securities and loans.

Box 1 – Law extending the recovery measures for undertakings in the banking and financial sector

During the recent financial crisis it emerged that the authorities did not have the necessary instruments to intervene in a future serious crisis in the financial sector.

On the basis of experience in other countries, the Belgian parliament voted a law on the extension of the recovery measures which the Belgian authorities can impose on institutions in the banking and financial sector (particularly credit institutions, insurance companies, settlement institutions and institutions equivalent to settlement institutions) facing such a serious threat to their financial position as to jeopardise Belgian or international financial stability. In practice, these measures mean that, in order to rescue an institution in the financial sector, the Belgian

State can launch a procedure which may lead to the transfer in one form or another of parts of the assets of the institution concerned or of securities which it has issued, provided the owners of the assets thus transferred are awarded compensation.

At the end of 2008, an International Monetary Fund report on Belgium had already recommended further expansion of the legal framework stipulating the conditions under which the State can intervene to assist financial institutions in the future, and allowing resources to be made available in the event of a crisis on the financial markets. The governments of various EU Member States have already proceeded to create or strengthen a legal framework regulating government intervention in favour of a credit institution or insurance company facing financial difficulties. For instance, in the United Kingdom the "Banking Act 2009" makes it possible for the government, following mutual consultation, to decide to transfer a credit institution's securities, assets or business activities. The purpose of this British regime is to safeguard the interests of the public, by ensuring financial stability, restoring investors' confidence in that stability and protecting savers.

Germany has also passed a law allowing the federal government to transfer to a public entity some or all of the shares in a financial institution, and similarly the claims and financial instruments of such an institution and the associated liabilities. That transfer may be effected by expropriation, in return for payment. Two other German laws amend the current legislation on companies in order to facilitate operations designed to stabilise troubled financial institutions, mainly via recapitalisation.

The Belgian government had already taken a number of measures in this connection with the law of 31 January 2009 on business continuity. However, that law was specifically drawn up for commercial and industrial undertakings, and therefore does not offer any adequate solutions in the event of a financial crisis affecting the financial institutions or implying a systemic risk.

Indeed, the law of 31 January 2009 does not offer the right instruments for rescuing credit institutions or insurance companies in difficulty. That law provides for a judicial reorganisation procedure, such as a suspension whereby the means of enforcement are suspended. While the suspension of individual prosecution may help commercial or industrial firms to revive their business, that does not apply to credit institutions, because for the latter the long-term public suspension of funds has a detrimental impact on public confidence in the banks. Owing to some specific characteristics of credit institutions and insurance companies, legal restructuring procedures are not suitable. Consequently, if a struggling financial institution does not gain access to additional resources, the speedy intervention of a buyer is the only credible approach. This may take place in various ways, in particular via the transfer of the institution itself or the transfer of parts of its business to other institutions. That may be done by arranging for an ad hoc structure ("bad bank" model) to take over assets which have lost their value, or by placing the sound assets in a newly formed structure ("good bank" model) pending a subsequent transfer ("bridge bank").

The law of 31 January 2009 also lacks satisfactory solutions regarding the intervention of a buyer, and more particularly an appropriate procedure for the transfer of universal title, since it deals only with the transfer of individual asset components ("ut singuli"). In addition, this law contains no rules on the transfer of the debtor's debts or current contracts. Furthermore, the law points out that the technique whereby the transfer is effected is a simple sale of assets, in which the requirements concerning objections must be satisfied individually for all the assets. For those reasons, and on account of the problems inherent in combining the restructuring procedure with the powers of the prudential regulator, the Belgian government proposed excluding credit institutions from the scope of the law of 31 January 2009, and extending that solution to the other undertakings subject to prudential supervision.

The law which the Belgian parliament voted provides for extension of the scope of the measures which the Banking, Finance and Insurance Commission (CBFA) and the King may take as part of the general rescue package devised in response to the financial market turmoil.

This law gives the CBFA the power to suspend the activities of credit institutions and insurance companies which are subject to its supervision. That suspension may lead to total or partial suspension of the execution of current contracts, to the extent determined by the CBFA. In principle, a pre-arranged recovery period must be fixed for the various recovery measures. The law also provides that in extremely urgent cases the CBFA may take the necessary measures without first specifying a recovery period.

In addition, if a credit institution, insurance company, settlement institution or institution equivalent to settlement institutions fails to operate in accordance with the applicable laws, potentially endangering the stability of the Belgian or international financial system, the King may launch a procedure in favour of the State or any other public or private Belgian or foreign person or entity in order to rescue that institution. Such a measure may provide for the transfer, sale or contribution of (1) assets, liabilities or one or more business divisions, or more generally some or all of the rights and obligations of the credit institution concerned, and (2) voting or non-voting shares issued by the credit institution, whether or not they represent the institution's capital. That measure is accompanied by the compensation of the owners of the transferred assets.

The procedure can only be launched by a decision passed following consultation of the Council of Ministers, at the request of the CBFA or on the initiative of the government, after obtaining the opinion of the CBFA and the Committee for systemic risks and systemically important institutions.

The law also regulates the notification and announcement mechanisms concerning the action taken by the State.

A second law to supplement the one mentioned above extending the recovery measures for undertakings in the banking and financial sector, and concerning the means of recourse, deals with the full protection of the proprietary interests of the owners of assets or shares in cases where the King has ordered their transfer. If the State wants to make use of the powers to order the transfer of assets or shares, it will have to refer the matter to the court of first instance for verification of both the legality of the transfer operation and the fairness of the proposed compensation. The transfer of ownership can only take place once the court has passed a judgment confirming that both conditions are satisfied.

These laws extending the recovery measures for undertakings in the banking and financial sector and the supplementary law on the means of recourse are therefore preventive in character, since they provide the government with instruments enabling it to intervene more promptly in future crises.

In the case of the sale of Fortis Bank to BNP Paribas, the Brussels Court ruled that the Belgian government must have the agreement of the general meeting of shareholders. The Court of Cassation has since annulled that decision. The laws enable the Belgian government, in a systemic crisis situation, to take a number of measures concerning a financial institution without the consent of the shareholders. In the future, it will therefore no longer be possible to block a sale by the government on the grounds that the prior approval of the shareholders is lacking. Consequently, it will be possible to take more effective action to deal with any future systemic crisis.

2. Banking sector

2.1 Balance sheet and business restructuring

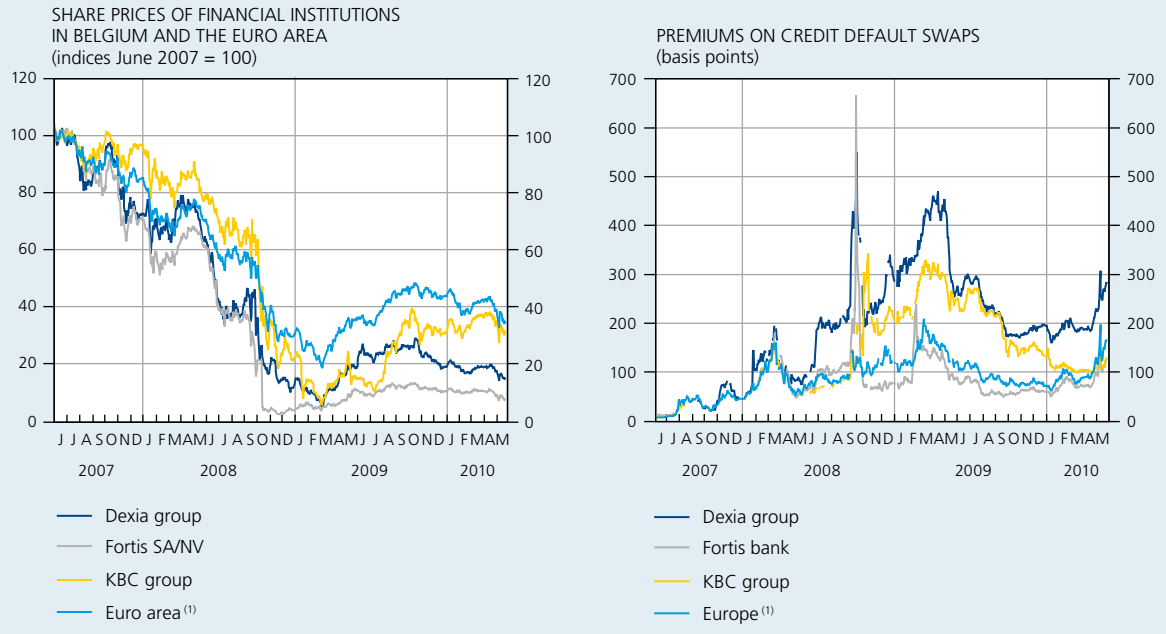
The heightened market concerns over fiscal positions in a number of euro area countries led to a significant new deterioration of market indicators concerning financial institutions in Europe and Belgium. Chart 13 provides an update for developments in the share prices and credit default swap (CDS) premiums of Dexia group, Fortis Bank (now a subsidiary of BNP Paribas), KBC group and Fortis SA/NV, the latter comprising the insurance activities of the former Fortis group with the exception of the group's former Dutch insurance activities. While these indicators showed significant improvements in the

course of 2009 relative to the situation prevailing in the second half of 2008 and first quarter of 2009, CDS premiums for European financials and Belgian credit institutions remained quite high when compared to the levels recorded in the summer of 2007, and increased sharply again as market concerns over some euro area countries intensified towards the end of April and in May. While the premiums on CDS referencing European financial institutions surged towards levels in line with previous highs, the premiums on CDS referencing Belgian financial institutions remained substantially below the peaks reached in 2008 or 2009.

An important factor shaping developments in the profitability, solvency and balance sheets of the main Belgian bancassurance groups was the implementation and execution of restructuring plans, aimed at addressing the vulnerabilities revealed by the global financial crisis. Last year's Financial Stability Review (pp. 28-34) provided details about the causes of the severe pressures on the profitability and liquidity position of key credit institutions and insurance companies in the Belgian financial system, in the weeks that followed the failure of Lehman Brothers on 15 September 2008. A description of the government interventions that were required to stabilise market confidence in the bancassurance groups Fortis, Dexia and KBC, and insurance company Ethias, can be found there as well. These interventions were instrumental in stabilising market confidence vis-à-vis systemically important banking and insurance companies in the Belgian financial system, while providing time and resources for the institutions to undertake restructuring plans and refocus their activities on core businesses. Some elements of these ongoing restructuring processes are part of the agreements reached with the European Commission on the remedial measures to be taken in return for the state aid received.

As regards KBC, the European Commission – acting in its capacity as the competition regulator – approved on 18 November 2009 the government support measures and the associated restructuring plan, whereby the group is to refocus on its core markets and activities and repay the government aid received. A 25 p.c. reduction in risk-weighted assets is to take place gradually up to 2013 and will mainly concern the portfolio of foreign loans and KBC's capital market activities, plus certain businesses in Belgium and in Eastern Europe. In order to be able to repay the capital support received from the federal and Flemish governments by the end of 2013, KBC plans to use the profits made over the coming years, the income from its divestments and the capital released by scaling

CHART 13 MARKET INDICATORS FOR BELGIAN AND EUROPEAN FINANCIAL INSTITUTIONS



Source : Thomson Reuters 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.

down its activities, and the proceeds of the stock market introduction of a minority stake in its Czech subsidiary, CSOB. KBC is keeping its bancassurance model intact, but refocusing it on the markets central to its strategy, namely Belgium and Central and Eastern Europe.

Dexia reached an agreement with the European Commission in February of this year. Under this agreement, Dexia is committed to sell its stakes in two main subsidiaries, in Italy and Spain, in addition to a number of other divestments, and to bring together in a legacy division its bond portfolios in run-off as well as some non-core activities. These assets in run-off will remain on the group's balance sheet and benefit from clearly identified and allocated funding, including all the government-guaranteed funding. While refocusing Dexia's business lines on its historical markets (Belgium, France, Luxembourg) and on Turkey, these divestments and the winding down

TABLE 1 KEY INDICATORS FOR THE 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]
	Fortis SA/NV[1]	Fortis Bank[1]				
Net profit						
2007	3.99		3.28	2.53	6.7	3.8
2008	–28.02	–20.56	–2.48	–3.33	–21.2	–3.9
2009	1.19	–0.67	–2.47	1.01	–1.2	1.0[4]
2010 (Q1)	–0.21		0.44	0.22		
Total assets						
2007	871.2		355.6	604.6	1,578.4	220.4
2008	92.9	586.8	355.3	651.0	1,422.1	223.8
2009	93.2	435.0	324.2	577.6	1,190.5	232.9[4]
2010 (Q1)			340.1	588.1		
Risk-weighted assets (RWA) (banking)						
2007		270.2[5]	135.1[6]	159.4[5]	583.5[7]	
2008		203.4[6]	141.4[6]	152.8[6]	491.7[6]	
2009		148.0[6]	128.3[6]	143.2[6]	407.1[6]	
2010 (Q1)			127.9[6]	142.7[6]		
Tier I ratio banking (p.c. of RWA)						
2007		9.5	8.7	9.1	12.1	
2008		10.7	9.7	10.6	11.3	
2009		12.3	11.0	12.3	13.2	
2010 (Q1)			11.0	12.5		
Risk asset ratio banking (p.c. of RWA)						
2007		10.1	12.7	9.6	11.2	
2008		18.7	13.5	11.8	16.2	
2009		19.0	14.8	14.1	17.3	
2010 (Q1)			15.1	14.3		
Insurance solvency margin (p.c. of required margin)						
2007	235		265			223[4]
2008	202		188			205[4]
2009	231		260			233[4]
2010 (Q1)	229		281			

Sources: Annual accounts of Fortis group, Fortis SA/NV (Ageas), Fortis Bank (BNP Paribas Fortis), Dexia group, KBC group, CBFA, NBB.
(1) Consolidated data, as published in the 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 recorded in the quarterly accounts.
(5) As calculated according to Basel I.
(6) As calculated according to Basel II.
(7) Mix of Basel I and Basel II risk-weighted assets.

of non-core activities will contribute to the realisation of a 35 p.c. reduction in the total balance sheet, between 2008 and 2014. Other elements of the agreement with the European Commission will build further on the progress already made in the context of Dexia's transformation plan (adopted in November 2008) to reduce its reliance on short-term funding from wholesale markets and to scale down market activities. The reliance on short-term funding is set to be reduced to maximum 11 p.c. of the balance sheet total at the end of 2014, with a target of 23 p.c. by the end of 2010.

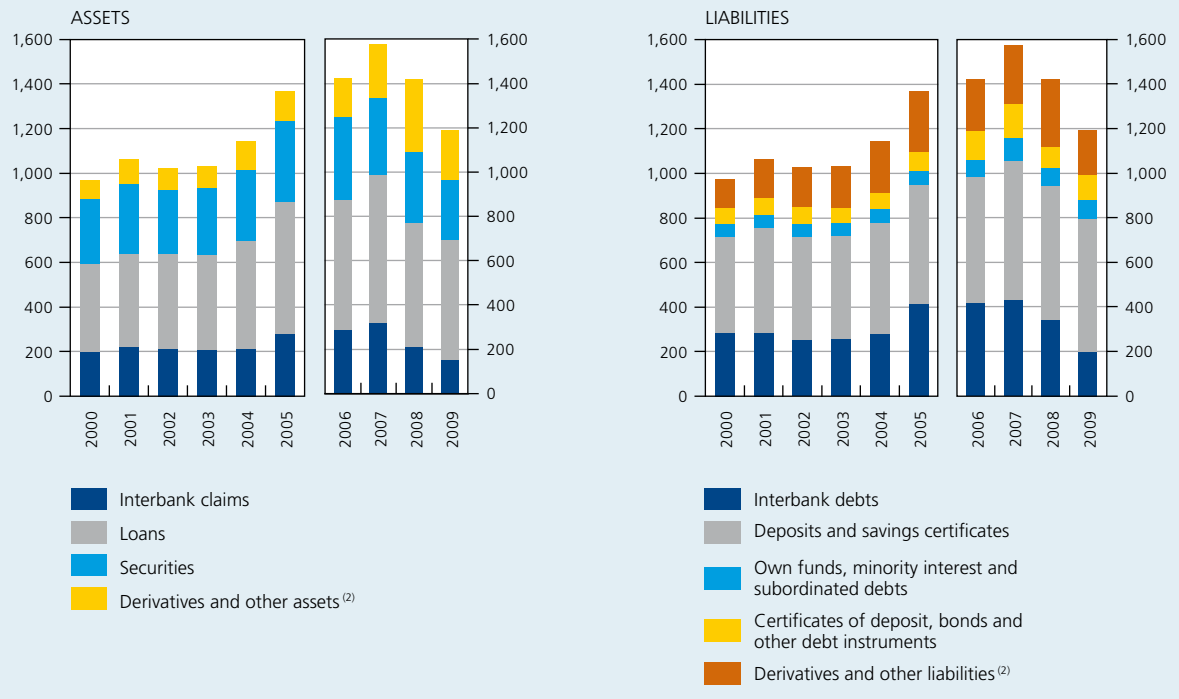
(1) As discussed in more detail in the Financial Stability Review 2005 (pp. 55-57), the supervision of the main bancassurance groups is conducted at three levels, namely sectoral supervision of banking and other financial subsidiaries, sectoral supervision of insurance companies, and supplementary supervision at holding company level. The above-mentioned standardised reporting schemes relate to 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 Crédit Local and its former 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 provides an overview of several key financial indicators for the main bancassurance groups in Belgium, together with 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 of Dexia Bank Belgium and not of the other subsidiaries of the Dexia group.[1]

A common development in the individual banks and bancassurance groups listed in the Table is a sharp decline in the size of the institutions' total assets and risk-weighted assets in 2009, leading to similar pronounced developments in the related sector aggregates. While the balance sheet deleveraging in 2008 had been mainly the result of the removal of Fortis Bank Nederland from the consolidation scope of Fortis Bank in the fourth quarter of that year, the driving forces of deleveraging in 2009 were more broadly based and organic. As will be highlighted in the remainder of this first sub-section, the refocusing of the Belgian banks' business models on their domestic and certain foreign core clients, together with the fundamental

CHART 14 BREAKDOWN OF ASSETS AND LIABILITIES[1]

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

re-evaluation of capital market activities and expansion into non-core markets, has indeed led to the placing into run-off of certain activities and portfolios, with a consequent decline in balance sheet totals. The coming quarters are likely to bring further declines in reported total assets, including as a result of a number of subsidiaries being divested, as foreseen in the agreements with the European Commission on the state aid received.

This major structural reform process in the Belgian banking sector is occurring in the context of a still challenging operating environment, important changes in the global financial system and a prospective tightening of regulations in a number of areas, including in the field of capital adequacy and liquidity. Many market and regulatory factors are thus likely to shape the earnings potential and financial resilience of the main Belgian credit institutions in the short and medium term, which in turn will determine their ability to exit from the state capital support measures and to re-establish strong financial positions on a stand-alone basis, without jeopardising their critical financial support functions for the real economy.

Chart 14 shows developments in the Belgian banking sector's aggregate balance sheet since 2000. It reveals that total assets expanded by more than 50 p.c. between 2003 and 2007, as the large Belgian banks embarked on foreign expansion and stepped up their trading activities by obtaining large volumes of finance on the wholesale markets. This balance sheet expansion maintained a long-term trend of rising bank assets in Belgium, as in many other countries indeed (Box 2). Yet, in the last quarter of 2008, a strong deleveraging process set in, starting with the deconsolidation of Fortis Bank Nederland out of Fortis Bank and continuing last year with a reduction in total assets from 1422.1 billion euro at the end of 2008 to 1190.5 billion euro at the end of 2009, which amounts to a decline of more than 15 p.c.

The category most affected by the reduction of the total balance sheet were the interbank assets and liabilities. On a consolidated basis, they have been markedly reduced since the middle of 2008 and have now reached levels lower than those prevailing at the beginning of the decade. In 2009, interbank claims and debts decreased by 57.1 billion euro and 142.3 billion euro respectively. As interbank deposits are used to collateralise counterparty risks in the case of derivative contracts, part of the decline in the interbank positions may have been driven by the declining marked-to-market value of derivative positions, which on both the assets' and the liabilities' side, contributed for slightly more than one third to the observed decline in the total balance sheet between the end of 2008 and the end of 2009.

The decreased reliance on the interbank market as a source of funding also resulted from a lesser need for short-term wholesale funding in downsized balance sheets, whereby banks economised first on financing sources which had become more difficult or more expensive to access, after the failure of Lehman Brothers, in this case secured and unsecured interbank financing. The analysis of intra-group and non-intragroup transactions of banking entities located in Belgium in Box 3 shows that the development of interbank positions in Belgium is also heavily influenced by transactions with sister or parent companies.

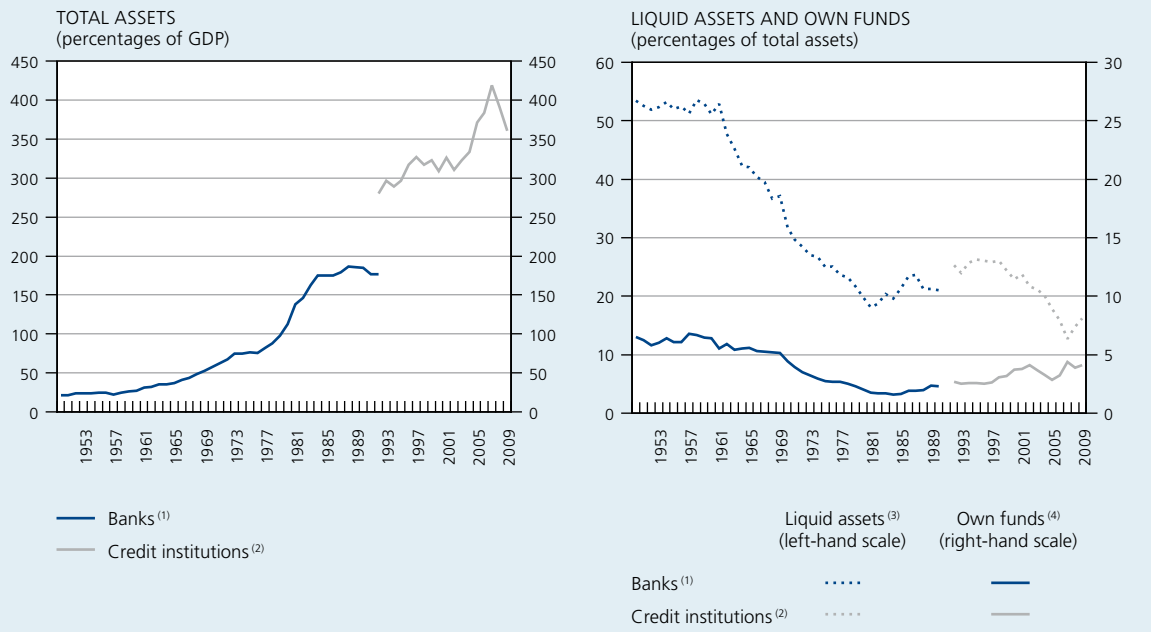
Box 2 – Historical time series

The chart below provides a historical perspective (1950-2009) to some of the recent developments in the banking sector. The break in the time series in the beginning of the 1990s is related to a change in the availability of consistent time series over long periods as, prior to 1992, some categories of credit institutions – such as savings banks and public sector banks – were subject to other reporting requirements than commercial banks.

The left-hand panel shows that total banking sector assets, as a percentage of GDP, expanded during three periods mainly. The first, and the longest, expansion took place between the end of the 1950s and the beginning of the 1970s, when a first, but short, consolidation period set in. Banking assets then expanded again strongly in the years between 1976 and 1983, followed by a period of flat or moderate growth. The third main period of growth started in 2004, lifting banking sector assets from 323 p.c. of GDP at the end of 2003 to 419 p.c. of GDP in 2007, before declining again to 361 p.c. of GDP by the end of 2009. Financial deepening in the economy (as households' and corporations' financial needs became more important and sophisticated) as well as general market trends (such as financial globalisation, the growing importance of interbank positions on both sides of banks' balance

HISTORICAL TIME SERIES

(unconsolidated data)



Sources: CBF, NBB.

(1) Bank assets, as reported in the Annual reports of the Commission Bancaire et Financière.

(2) Including savings banks and public credit institutions, not covered in the time series concerning the banks for the period 1950-1992.

(3) For the series related to the banks in the period 1950-1992, liquid assets include the outstanding amounts of the following assets: cash and cash equivalents, short-term claims, government securities eligible for refinancing at the central bank and other government securities. For the series related to the credit institutions in the period 1992-2009, liquid assets include the outstanding amounts of the following assets: cash, cash equivalents and interbank sight deposits, government securities and other short-term negotiable instruments.

(4) Total own funds, including reserves.

sheet and financial innovation) contributed to this development in the sector's total assets, as indeed in many, if not most, other advanced economies. The Belgian banks' strategy of international expansion, which accelerated in the 1990s, has undoubtedly also led to higher assets during this last period, an increasing proportion of which then in fact concerned exposures on non-Belgian residents.

The right-hand panel of the chart shows the development, over time, of the amount of own funds and liquid assets as a percentage of total assets. The share of own funds, which accounted for more than 5 p.c. of the balance sheet in the 1950s and 1960s, declined significantly over the next 15 years, in order to bottom out in 1984 at 1.6 p.c. and subsequently recover to 4.1 p.c. in 2002. Between 2002 and 2006, it declined again, before rising in 2007 as a result of the capital increase by Fortis in order to finance the acquisition of parts of ABN AMRO.

As concerns the share of liquid assets – as somewhat arbitrarily defined as the sum of cash, cash equivalents and government securities' holdings –, the time series shows a trend decline in the weight of cash and government securities holdings over time, with a pronounced reduction in the liquid asset ratio in the decade preceding the recent financial crisis.

For a correct interpretation of these developments over time in the own funds and liquid asset ratios, the respective roles of several factors must be analysed, which is an undertaking that goes beyond the scope of this Box. One

of these factors to be analysed is the development of financial markets and the expansion of wholesale financial activities on both sides of banks' balance sheet during this long time period, in line with the opportunities being offered by ITC revolutions and financial globalisation to develop more efficient and liquid global capital markets. Similarly, some of the decrease in the leverage ratio since the 1950s and 1960s – which contributed to increases in shareholders' rate of return – was probably justified by genuine improvements in the risk measurement and management capabilities of the banks. Yet, as shown by the crisis, banks' and other agents' perceptions of these structural improvements in the field of market liquidity and risk management probably went beyond the extent of the real progresses being achieved in these areas, leading to liquidity and capital reserves no longer justified by the risks assumed by financial institutions and the system as a whole. Regulatory authorities have therefore undertaken a profound re-evaluation of banks' capital and liquidity regimes, with the aim of strengthening certain minimum capital and liquidity buffer requirements (see the related article in this FSR "Building a more stable financial system : regulatory reform in a post-crisis perspective").

Box 3 – Analysis of interbank positions : intragroup versus non-intragroup

Territorial statistics collected by the National Bank of Belgium on behalf of the Bank for International Settlements (BIS) allow analysis of cross-border intragroup and non-intragroup interbank transactions of banking entities located in Belgium. Intragroup transactions comprise transactions with subsidiaries, branches, sister companies and parent companies, with the exception of the intragroup transactions with other group entities located in Belgium. All banking entities located in Belgium (including subsidiaries and branches of foreign banks) report these data.

The total non-intragroup interbank transactions as collected for the BIS differ from the interbank positions on a consolidated basis shown in Chart 14 for a number of reasons. First, the territorial BIS data have a broader scope, covering all forms of interbank exposures (including debt securities). Second, the data shown in Chart 14 also include intragroup data, for instance because only Dexia Bank Belgium, and not Dexia group, or ING Belgium and not ING group, are included in these consolidated data. Third, on a consolidated level, figures include transactions by the subsidiaries and branches of Belgian banks located outside Belgium. Finally, the scope of reporting differs, as only banks with subsidiaries are required to report consolidated data.

Many banking entities located in Belgium (including branches and subsidiaries of foreign banking groups) are part of bigger banking groups, some of them resident in Belgium. Hence, the funding and borrowing patterns of these entities are strongly influenced by transactions with associated companies : either the parent company or subsidiaries, branches and sister companies. Significant amounts of deposits collected in Belgium are used to finance activities elsewhere. Broadly speaking, two different models for recycling deposits within a group across borders can be distinguished : one where liquidity is recycled via a parent company (e.g. Dexia or KBC) and one where this occurs via a subsidiary (e.g. ING or Deutsche Bank). More information about this particular topic can be found in the article in this FSR "The banking market (jigsaw) puzzle : Would coming closer to a stand-alone subsidiary model automatically lead to cross-border re-fragmentation ?", in the Box "Do Belgian banks operate internal markets ? Evidence from intragroup flows".

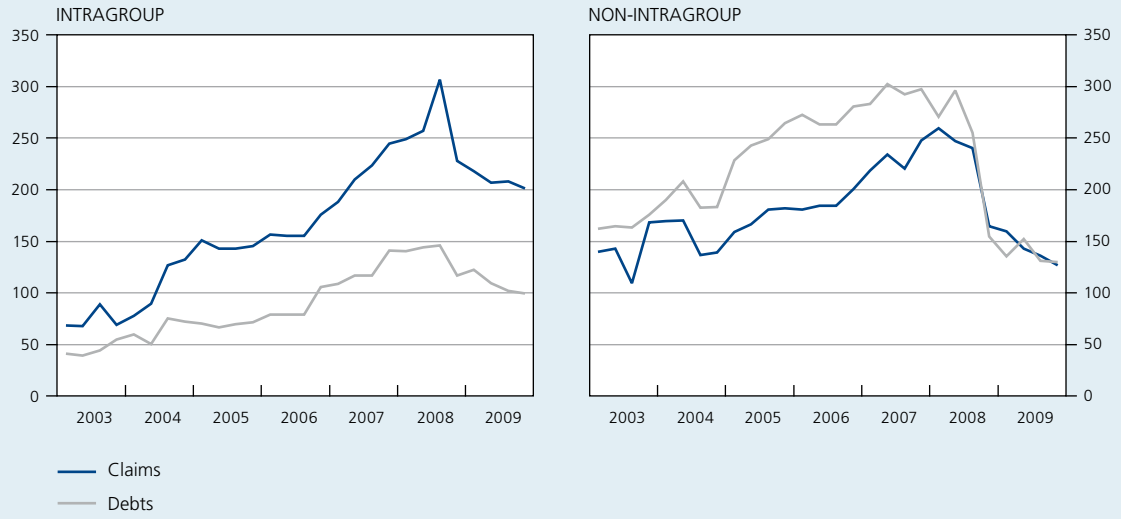
The banking entities located in Belgium have, in aggregate, been net providers of finance for other group entities since 2003 at least, and the gap between gross intragroup interbank claims and gross intragroup interbank debts increased significantly in the period up to the third quarter of 2008. The strong decline in the gross intragroup

claims in the quarter that followed resulted from the deconsolidation of Fortis Bank Nederland, which received at that time a lot of intragroup financing from Fortis Bank.

As regards the non-intragroup transactions, interbank claims were consistently lower than interbank debts before the onset of the financial crisis, creating a net non-intragroup debtor position. Banking entities located in Belgium borrowed thus more than they lent on the interbank market in order to finance cross-border intragroup lending or other foreign exposures. That situation came to an end in the second half of 2008, with banking entities located in Belgium granting and receiving broadly similar amounts of non-intragroup interbank financing. Hence, in net terms, interbank transactions have recently been confined almost entirely to intragroup operations. However, non-intragroup transactions remain substantial in gross terms, notwithstanding a sharp decrease and a return to the levels reached in 2003.

CROSS-BORDER INTERBANK CLAIMS AND DEBTS OF BANKING ENTITIES LOCATED IN BELGIUM

(data on a territorial basis, billion euro)



Source: NBB.

With falling interbank debts and declining marked-to-market positions in derivatives accounting for the bulk of the reduction of the balance sheet in comparison to the end of 2008, developments in other liabilities were mainly characterised by some significant changes in the composition of total funding obtained through deposits and securities. While the total amount of deposits fell very slightly in 2009 (by 4.4 billion euro to 595.5 billion euro), retail deposits and savings certificates (*bons de caisse* / *kasbons*) – targeted at retail clients – increased by 33.2 billion euro, offsetting almost all of the decrease in non-retail deposits (by 37.6 billion euro). The total amount of certificates of deposit and bonds issued by Belgian banks increased in 2009 by 16.6 billion euro. Some of these changes in liabilities are discussed in more detail in section 2.4.

Turning to the assets' side of the balance sheet, the decline in loans to credit institutions, by 57.1 billion euro, is responsible for three quarters of the decline in total loans and advances between the end of 2008 and 2009 (Table 2). Over this same period, loans to customers declined from 555.5 billion euro to 536.5, reflecting mainly a decline in loans other than mortgage loans from 423.3 billion euro at the end of 2008 to 378.1 billion.

TABLE 2 BREAKDOWN OF THE LOAN PORTFOLIO AND BANKS' DEBT SECURITIES HOLDINGS
(consolidated data)

	Billion euro			Share of counterparties resident in Belgium		
	2007	2008	2009	2007	2008	2009
Loans and advances[1]						
Credit institutions	320.8	213.2	156.1	1.5	1.1	1.1
Corporate	313.5	290.7	244.4	9.8	14.4	14.6
Retail	276.2	208.0	237.4	15.3	18.4	25.0
Central governments	16.4	13.3	14.4	1.0	0.8	1.3
Non-credit institutions[2]	60.1	43.5	40.3	3.1	4.3	5.1
Total	**987.0**	**768.7**	**692.6**	**30.6**	**39.1**	**47.1**
Debt securities						
Credit institutions	80.2	63.7	53.1	0.4	0.1	0.2
Corporate	70.2	71.7	49.1	0.4	6.5	0.4
Central governments	136.6	156.7	156.7	15.5	16.1	20.9
Non-credit institutions[2]	8.9	6.6	5.8	0.2	0.2	0.3
Total	**296.2**	**298.8**	**264.7**	**16.6**	**23.0**	**21.7**

Sources: CBFA, NBB.
(1) Including the loans and advances reported under Held for trading (respectively 39.1, 13.5 and 4.3 billion euro at the end of 2007, 2008 and 2009).
(2) The counterparty Non-credit institutions covers *inter alia* loans to financial institutions other than banks and to local government authorities.

The outstanding amount of (mainly term) loans to corporates located outside the euro area recorded a particularly large fall, with reverse repo transactions accounting for 17.3 billion euro of the drop. Loans to the retail sector increased, following a rise in the amount of mortgage loans. However, this growth was partly influenced by one major bank reclassifying securitised assets as mortgage loans. Even if this transfer is taken into account, exposures on the retail sector nonetheless increased in 2009.

The share of loans and advances to Belgian counterparties in the total loan portfolio increased sharply last year. While these debtors represented only 30.6 p.c. of total loan exposures at the end of 2007 and 39.1 p.c. at the end of 2008, their share was up to 47.1 p.c. at the end of last year. This shift in the loan portfolio of Belgian banks occurred mainly at the expense of counterparties residing outside the euro area.

The debt securities portfolios were reduced following the already-mentioned change of focus to more traditional banking activities and away from trading activities. In this connection, Chart 15 reveals a sharp fall in the outstanding amount of non-sovereign debt securities accounted for as Held for trading and Available for sale. Besides the placement of some portfolios in run-off, this development reflected the reclassification of certain Held for trading and Available for sale assets to the Loans and receivables category, in the last quarter of 2008 and the first half of 2009, following amendments made to the IAS 39 standard. Since June 2008, the amount of corporate and bank bonds included in Loans and receivables has increased by 37.8 billion euro, while instruments reported as Held for trading and Available for sale declined by 23.6 and 66.9 billion euro respectively. The reduction in the total amount outstanding of corporate bonds was, however, influenced by the above-mentioned reclassification of some securitised assets as mortgage loans. Excluding this transaction, the reduction in the outstanding amount of non-government debt securities between the end of June 2008 and the end of December 2009 is 34.2 billion euro. Besides the portfolios that were put in run-off by various banks, this amount also relates to the sale of a structured credit portfolio by Fortis Bank to a defeasance vehicle (Royal Park Investments – RPI) on 12 May 2009.

In contrast to the marked decline in non-sovereign debt securities, the outstanding amount of government bonds – an important portfolio in the context of banks' liquidity management – remained stable in 2009. The exposures

to central governments in the form of debt securities holdings totalled 156.7 billion euro at the end of 2009 which is slightly less than 60 p.c. of the total debt securities portfolio.

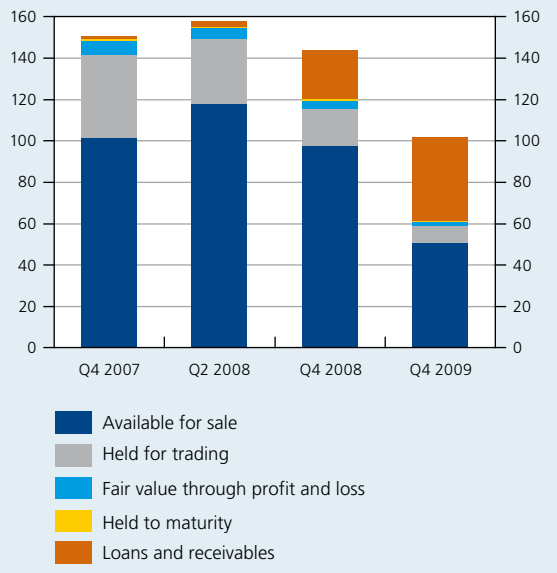
Belgian sovereign bonds account for 21 p.c. of total debt securities holdings, while the shares of sovereign bonds of countries located within and outside the euro area come to 30 p.c. and 8 p.c. respectively. BIS data show that exposures to foreign public sector debtors, including local authorities, totalled 133.8 billion euro at the end of 2009. Among those, exposures to Italian, Dutch, Czech, German and French authorities are the most important, accounting for 57.4 p.c. of the total. Even though they represent smaller amounts, exposures to the Spanish, Portuguese and Greek public sectors are also significant, totalling 7.1 billion euro, 6.0 billion euro and 5.3 billion euro respectively.

The second half of 2009 was characterised by a rise in sovereign CDS premiums in view of doubts about the sustainability of fiscal positions in certain countries, in particular Greece. A weighted CDS premium, taking into account the 15 largest exposures of the Belgian banking sector (in the form of loans and debt securities) on foreign public sectors is presented in Chart 16. These exposures represent 91 p.c. of the Belgian banks' total claims on foreign public sectors. The profile of the weighted CDS premium suggests that these exposures are concentrated in countries with the lower CDS premiums.

By placing some loan and debt security portfolios into run-off, the Belgian banks aim to reduce the size of their balance sheet. In this connection, Chart 17 shows that exposures on non-bank counterparties have been primarily reduced in the so-called non-core markets. While exposures to Dutch counterparties were strongly reduced at the end of 2008, following the deconsolidation of Fortis Bank Nederland, the amounts of claims on counterparties located in other core markets (including Belgium) continued to increase. Conversely, exposures on counterparties located in non-core markets have been reduced substantially since June 2008. Looking ahead, this trend is expected to strengthen as restructuring plans progress. Also, some countries that may be considered as core markets today will probably cease to form part of this category in the future.

CHART 15 BREAKDOWN OF THE CORPORATE (1) AND BANK BOND PORTFOLIO ACCORDING TO IAS/IFRS PORTFOLIO CLASSIFICATION

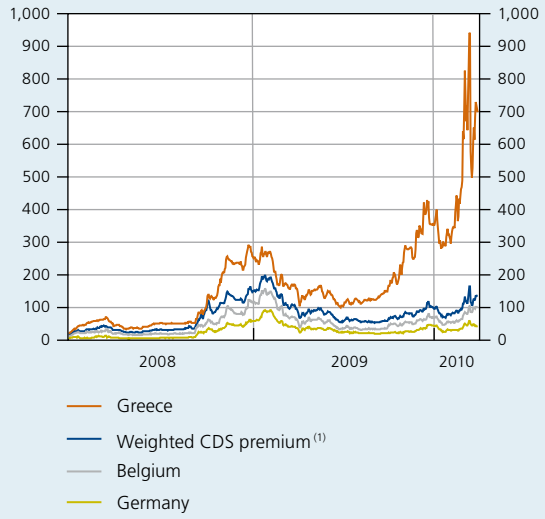
(consolidated data, billion euro)



Sources : CBFA, NBB.
(1) Including structured finance instruments.

CHART 16 CDS PREMIUMS ASSOCIATED WITH BELGIAN BANKS' EXPOSURES TO THE PUBLIC SECTOR

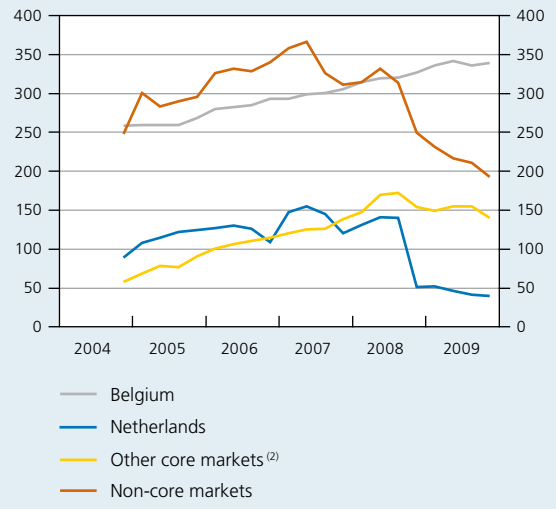
(basis points)



Sources : CBFA, NBB, BIS.
(1) The weighted sovereign CDS premium takes into account the amount of the exposure of Belgian banks vis-à-vis public authorities in each country as of end-December 2009. Only the 15 largest exposures (with a minimum size of 1 billion euro) are taken into account in the calculation. Figures taken into account for Belgium only refer to exposures to the Belgian central government. Data are recorded on an ultimate risk basis, that is taking into account effects of guarantees received and credit derivatives bought for protection purposes, except for the exposures on the Belgian central government.

CHART 17 CLAIMS OF BELGIAN BANKS ON CORE AND OTHER MARKETS: EXPOSURES ON THE NON-BANK PRIVATE AND PUBLIC SECTORS, BY COUNTRY OF RESIDENCE OF THE COUNTERPARTY (1)

(consolidated data, billion euro)



Sources: CBFA, NBB, BIS.

(1) National data consistent with the Consolidated banking statistics of the Bank for International Settlements (BIS) are used, except for exposures on Belgian counterparties, for which data from the FINREP reporting scheme are used. BIS data are collected on an ultimate risk basis. FINREP data are collected on an immediate risk basis.

(2) Are included in the so-called core markets, based on the current state of the divestment plans of the main credit institutions: France, Ireland, Luxembourg, Czech Republic, Hungary, Poland, Russia, Slovakia and Turkey. Some countries that are considered here as core markets are possibly considered to be non-core markets in a medium-term perspective by some of the main credit institutions.

2.2 Profitability and solvency

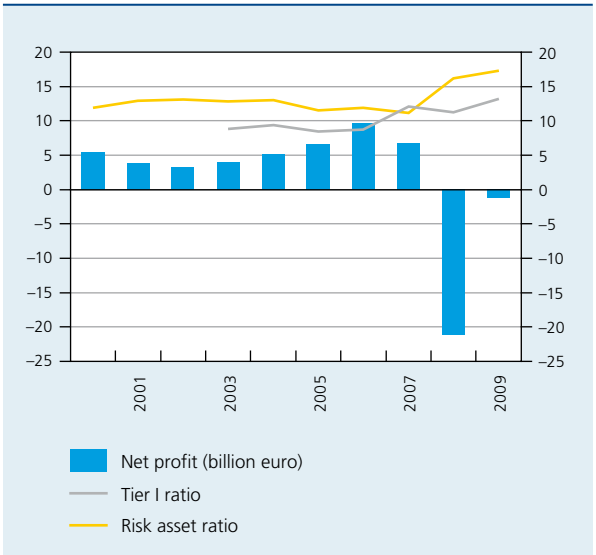
As in 2008, the main explanations for the net bottom-line loss recorded by the Belgian banking sector in 2009 were exceptional crisis-related losses and one-off risk charges, sometimes related to restructuring and de-risking strategies undertaken by the main bancassurance groups (Chart 18). At 1.2 billion euro, this net loss was, however, significantly lower than in the *annus horribilis* of 2008, when a loss of 21.2 billion euro had to be recognised. To the extent that these losses and de-risking measures relieved banks of potential future losses or of business activities and legacy exposures out of line with the banks' new business strategy, they will contribute to the restoration of profitability. As a matter of fact, the second half of 2009 was already less dominated by crisis-related items than the first half of 2009 or the second half of 2008, as the net-bottom line result during that period amounted to a profit of 0.9 billion euro. The results published by the main bancassurance groups for the first quarter of 2010 confirmed this improved trend for the first months of the current year. A consolidation of this recovery of profitability, especially in the revenue and cost elements constituting the banks' net operating income, will be important for re-establishing the sector's financial resilience on a stand-alone basis, while providing a first buffer against potential additional unexpected developments in the operating environment.

Regulatory solvency ratios remained at a high level or even improved in 2008 and 2009, in spite of the large cumulative income statement loss (22.4 billion euro) recorded during this period. The changes in the level of the Tier I ratio and the risk asset ratio between the end of 2007 and the end of 2009 reflect several developments, including government-led recapitalisations through Tier I capital instruments, the composition of the income statement losses in 2008 and 2009, and the complete transition in 2008 to the Basel II framework for the calculation of the risk-weighted assets. Some indications about the relative importance of these developments can be gathered from the data reported in Table 3, 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 calculated according to the Basel I and Basel II frameworks respectively.

In 2008, as explained in last year's Financial Stability Review, the level and composition of total regulatory capital had been strongly influenced by the reversal, by Fortis Bank, of deductions from total regulatory capital.

CHART 18 PROFITABILITY AND SOLVENCY

(consolidated data, percentages, unless otherwise stated)



Sources: CBFA, NBB.

This reversal was related to the divestment of Fortis Bank Nederland and of the part of the ABN AMRO activities that Fortis had acquired in 2007 as part of a consortium for a total consideration of 24 billion euro. Conversely, Tier I capital had fallen as a result of the sector's large income statement loss, partly compensated by recapitalisation operations, most of which involved resources provided by the public authorities.

In 2009, Tier I capital remained more stable. During the first half of the year, KBC group used its recapitalisation by the Flemish Community to strengthen the common equity of KBC Bank by 3.25 billion euro. This injection of common equity offset, at the level of the sector, the impact of the income statement loss and of increased deductions related to participations and deferred tax assets. The decline in total available regulatory own funds in 2009 thus mainly reflected the decrease in the outstanding amount of Tier II regulatory capital components, mostly as the result of the early repayment or buy-back of some Tier II capital securities.

With a decrease of no less than 30 p.c. between the end of 2007 and the end of 2009, changes in the amount of risk-weighted assets have also been an important driver of the recent developments in regulatory solvency ratios. In 2009, they were reduced to 407.1 billion euro from 491.7 billion at the end of 2008, owing to the decrease in the balance sheet total (leverage effect) and developments in the average risk weight applied to these assets (risk effect). As regards the latter effect, factors leading to increased risk weights were in fact counterbalanced by the (actual implementation of) state guarantees on impaired assets and transfers of assets to a defeasance vehicle.

The relative importance of these leverage and risk effects in the fluctuations of the Tier I solvency ratio is shown in Chart 19. The leverage effect reflects recourse to leverage, i.e. the volume of assets financed for a given amount of Tier I capital, while the risk effect measures the impact of changes in the average degree of risk of the assets. The Tier I capital ratio can indeed be broken down as follows:

$$\frac{Tier\ I}{RWA} = \frac{Tier\ I}{Total\ assets} * \frac{Total\ assets}{RWA}$$

$$\frac{Tier\ I}{RWA} = \frac{1}{Leverage\ ratio} * \frac{1}{Average\ risk}$$

TABLE 3 BREAKDOWN OF REGULATORY SOLVENCY RATIOS

(consolidated data, billion euro, unless otherwise stated)

	2006	2007	2008	2009
Total regulatory own funds	**62.3**	**63.6**	**79.5**	**70.3**
Composed of:				
Tier I [1]	45.9	67.5	55.7	53.9
Tier II [2]	19.7	22.6	24.6	17.3
Tier III [3]	0.1	0.0	0.1	0.2
Deductions from total capital [4] (–)	3.3	26.6	1.0	1.0
Risk-weighted assets as calculated according to (p.c. of total)	**526.9**	**583.5**	**491.7**	**407.1**
Basel I	100	77	0	0
Basel II	0	23	100	100
Solvency ratios (percentages)				
Tier I ratio	**8.7**	**12.1**	**11.3**	**13.2**
Risk asset ratio	**11.9**	**11.2**	**16.2**	**17.3**

Sources: CBFA, NBB.

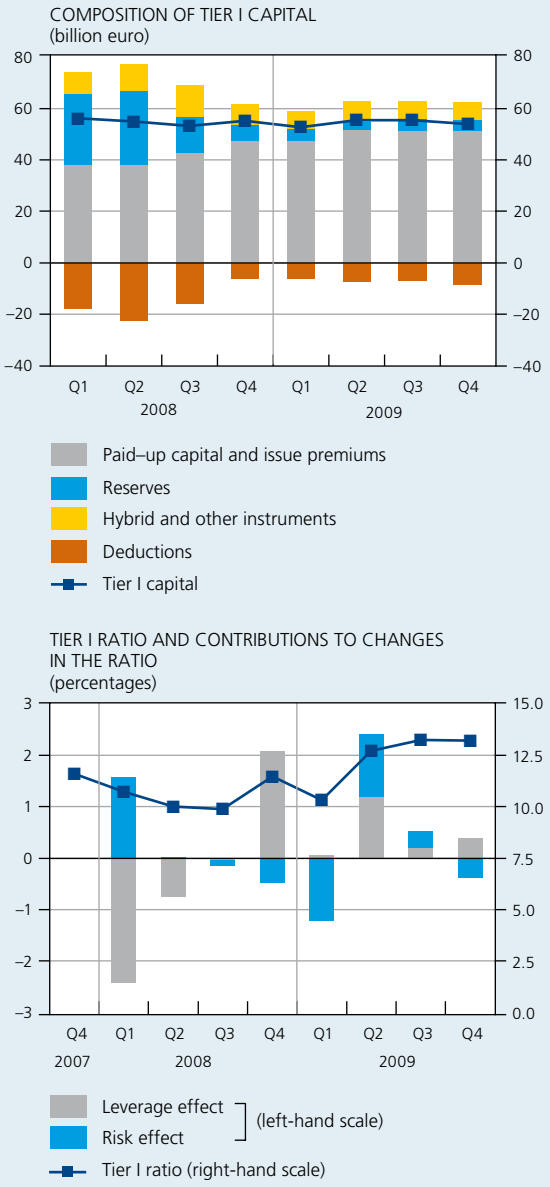
(1) Includes paid-up capital and share premiums, eligible reserves and income from the current year, revaluation reserves and associated prudential filters, hybrid capital instruments, third-party interests and deductions (e.g. intangible assets, participations).

(2) Includes 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, and 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 of total regulatory capital between 2006 and 2008.

CHART 19 REGULATORY CAPITAL AND SOLVENCY RATIO
(consolidated data)



Sources: CBFA, NBB.

These two effects have had a very variable influence in the past eight quarters.

The leverage effect broadly followed the changes in the balance sheet, as Tier I capital remained relatively stable. Increases in the balance sheet total in the first two quarters of 2008 led to a negative leverage effect, in contrast to the balance sheet reductions during the last quarter of 2008 and the last three quarters of 2009.

The risk effect was largely positive in the first quarter of 2008 owing to the more favourable risk-weighting coefficients allowed by the application of the Basel II regulatory requirements to all assets of Belgian credit institutions. Exposure reductions in low-risk segments and adverse rating migrations in structured finance product portfolios increased the average risk weight in the last quarter of 2008 and the first quarter of 2009. This effect was reversed during the second and third quarters of 2009, partly as a result of the transfers of structured finance instruments to a defeasance vehicle, and government guarantees received on structured finance exposures. During the last quarter of 2009, the average risk increased again, to some extent reflecting adverse rating migrations in the more traditional loan books as a result of the impact of the economic recession on the financial position of the banks' debtors.

The solvency ratio will certainly be affected by the new Basel requirements in preparation. To calibrate these requirements more precisely, major international banking groups have participated in a quantitative impact study.

Another important area of discussion, with accounting authorities, is how to improve the alignment of regulatory and accounting reporting requirements. As shown in Box 4, the present differences have a major impact on the reported level of regulatory and accounting own funds.

Box 4 – Regulatory and accounting own funds

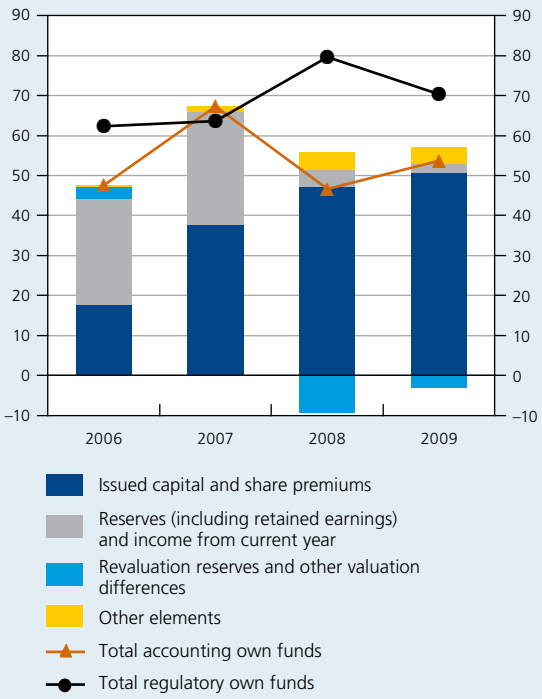
The development of accounting own funds also shows a decrease in the leverage of the Belgian banking sector in 2009, as the decline in the balance sheet total during that year was combined with a rise in total book equity to 53.7 billion euro. The chart below shows its development and breakdown in the period 2006-2009,

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 accounting capital increased in 2007, then dropped back in 2008 and increased again in 2009.

As the recapitalisation of KBC Bank was partly compensated by the decline in reserves and retained earnings, the increase in accounting equity in 2009 mainly resulted from a change in the outstanding amount of the revaluation reserves and other valuation differences. In this connection, there is an important difference between regulatory own funds and accounting equity in the treatment of unrealised gains or losses in some of the revaluation reserves. In the calculation of regulatory own funds, prudential filters are applied to some of these unrealised gains or losses, 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 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 Available for sale 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

DEVELOPMENT AND BREAKDOWN OF ACCOUNTING EQUITY

(consolidated data, billion euro)



Sources: CBFA, NBB.

losses on Available for sale bonds – judged temporary – are not taken into account for the calculation of regulatory capital, following the application of the prudential filters.

As marked-to-market values of bonds overall recovered in 2009 and part of the Available for sale assets were disposed of, accounting own funds were affected positively by a decrease in the negative Available for sale revaluation reserve. This improvement stemmed from two different sources. First, owing to an improvement in asset prices, net gains not recognised in the income statement increased. Second, as part of the Available for sale assets were sold, losses previously recorded in the Available for sale reserve were realised and thus transferred to the income statement.

For the Available for sale assets reclassified to the Loans and receivables portfolio, the changes previously recorded in the fair value of the assets transferred are still recorded under the revaluation reserve, as the part of the reserve referencing these reclassified assets is frozen and amortised according to the maturity of the assets in question.

The ability of Belgian banks to generate profits will be a key element in preparing the exit from state capital support and in strengthening the level of common equity in anticipation of the future, more stringent, Basel rules concerning minimum capital requirements and the definition of regulatory capital (see the article in this FSR: "Building a more stable financial system: regulatory reforms in a post-crisis perspective").

Table 4 shows the main aggregates of the Belgian banking sector's income statement for the last three years. While improving in comparison to the heavy losses recorded in 2008, the sector recorded a loss of 1.2 billion euro in 2009, consisting of a loss of 2.2 billion in the first half of the year and a profit of 0.9 billion in the second half. However, this better bottom-line result in the second half of 2009 was only achieved thanks to a large exceptional gain related to deferred tax assets in one major institution. Indeed, for the whole year, the net operating income before tax remained negative to the tune of 3.0 billion euro.

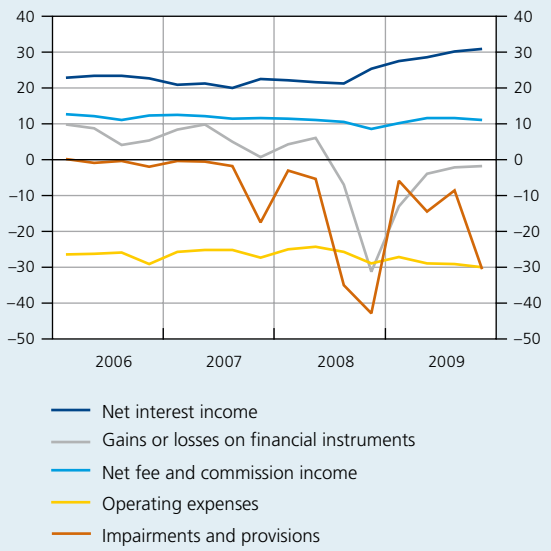
Exceptional items in the operating income were, on balance, negative. They included substantial losses on CDO-related positions at KBC Bank in the first half of the year and the alignment of Fortis Bank's accounting policies with those of its new parent company BNP Paribas.

The influence of exceptional losses on net operating income is evident from Chart 20 which presents, on a quarterly and non-cumulative basis, the principal components of net operating income. Losses and impairments on financial instruments recognised as Held for trading or Available for sale had a strong influence on the Belgian banks' income statement in the last two quarters of 2008 and the first quarter of 2009. In addition, impairments on Loans and receivables started to depress Belgian banks' results from the second quarter of 2009. Net interest income increased as a percentage of total assets from the end of 2008, offsetting part of the effects mentioned previously.

In 2009, net interest income represented almost 80 p.c. of total operating income, up from 75 p.c. in 2008 and 51 p.c. in 2007, underlining the re-orientation of the profitability drivers of the Belgian banking sector.

CHART 20 MAIN COMPONENTS OF THE OPERATING INCOME

(percentages of total assets, basis points)



Sources: CBFA, NBB.

TABLE 4 MAIN COMPONENTS OF THE INCOME STATEMENT

(consolidated data)

	Billion euro			Percentages of operating income
	2007	2008	2009	
Net interest income	**13.30**	**14.48**	**14.89**	**79.1**
Non-interest income	**13.01**	**4.80**	**3.93**	**20.9**
Net fee and commission income	7.35	6.76	5.66	30.1
(Un)realised gains or losses on financial instruments (1)	3.76	–3.83	–2.74	–14.5
Other non-interest income	1.91	1.86	1.01	5.4
Total operating income	**26.31**	**19.28**	**18.82**	**100.0**
Total operating expenses	**–16.08**	**–16.59**	**–14.61**	**77.7** (2)
Staff expenses	–9.15	–9.20	–7.94	42.2
General and administrative expenses (including depreciation)	–6.93	–7.39	–6.67	35.5
Total impairments and provisions	**–3.18**	**–13.31**	**–7.36**	
Impairment on Loans and receivables	–0.38	–2.84	–5.59	
Impairment on other financial assets	–2.50	–7.46	0.29	
Other impairments and provisions	–0.30	–3.01	–2.06	
Other components of net operating income (3)	**0.64**	**–0.83**	**0.11**	
Net operating income (4)	**7.71**	**–11.43**	**–3.04**	
Total profit or loss on discontinued operations	**0.00**	**–9.04**	**0.00**	
p.m. Net profit or loss (bottom-line result) (5)	***6.66***	***–21.21***	***–1.22***	

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) Other components of net operating income comprise the share in profit or loss of associates and joint ventures accounted through the equity method, and the profit or loss from non-current assets and disposal groups classified as held for sale, not qualifying as discontinued operations.

(4) Including the negative goodwill recognised immediately in profit or loss, which is not shown as such in the table, and amounted to 0.02 billion euro in 2007, 0.03 billion euro in 2008 and 0.00 billion euro in 2009.

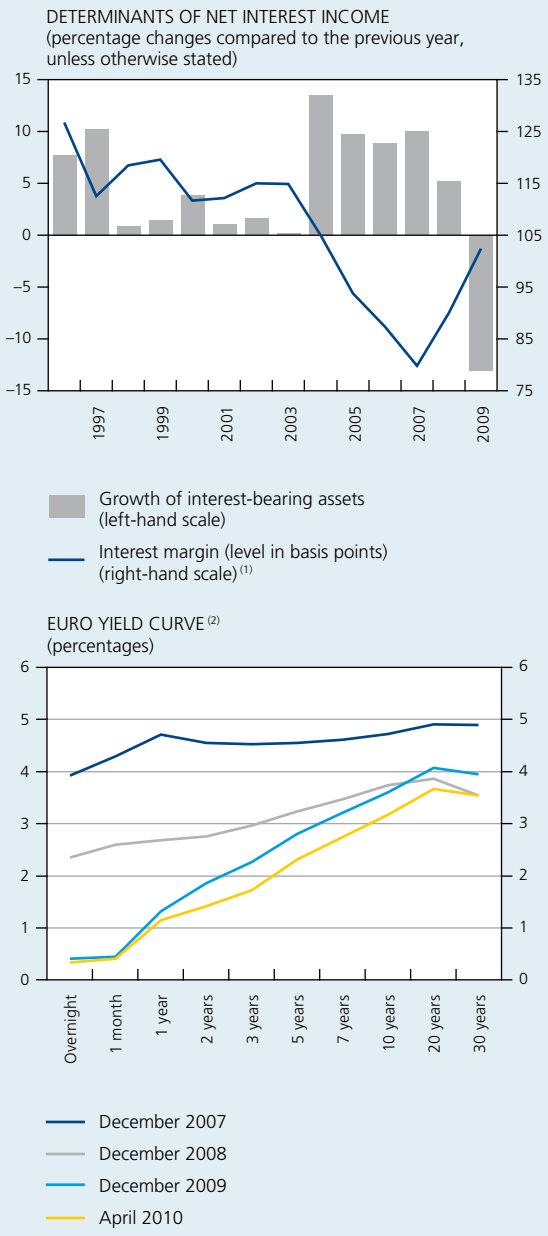
(5) The amounts of taxes and minority interests, which are items explaining the difference between net operating income and the net bottom-line result, are not broken down in this table, but can be found in Table 10 of the Statistical annex.

In absolute terms, net interest income improved by 2.8 p.c. to 14.9 billion euro in 2009, benefiting from a large increase in the interest margin for the second consecutive year, which offset the marked decrease in the volume of interest-bearing assets and liabilities (Chart 21). Following numerous interest rate cuts by the ECB, the euro yield curve steepened. While the spread between overnight and 30-year interest rates was only 98 basis points at the end of 2007, it reached 354 basis points at the end of 2009. This led to a one-off increase in the interest margin, as banks are usually short-term borrowers and longer-term lenders. Also, banks remained cautious in their lending business and tightened credit standards, consequently taking higher margins than before on the loans granted. Finally, the margin increased automatically with the reduction in low-margin business, especially interbank transactions.

Looking ahead, the average funding cost may increase as a result of the rebalancing of the funding structure towards liabilities with longer maturities and of increased competition for retail deposits. While a flattening of the yield curve is expected to have a negative impact (as spreads of maturity transformation activities are expected to reduce, on average) it could also be positive in certain segments. Indeed, rates have reached historically low levels at the short end of the curve. A flattening of the curve as a result of higher short-term interest rates

would allow banks to benefit comparatively more from an increasing spread between certain cheap deposits and higher returns on their reinvestments. The uncertainty as regards the impact of future interest rate changes is amplified by the fact that not all individual banks saw their interest income increase in 2009 as a result of the steeper yield curve.

CHART 21 DETERMINANTS OF NET INTEREST INCOME
(unconsolidated data)



Sources: CBFA, Thomson Reuters 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.

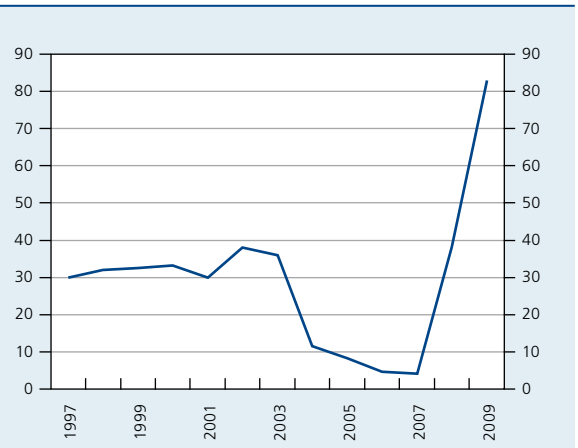
Non-interest income decreased by 18.2 p.c. in 2009. This is primarily due to the substantial losses recognised by KBC Bank on CDO-related positions, which more than offset the positive impact of rising asset prices and favourable market trading conditions on other components of the net (un)realised gains or losses on financial instruments. It may be noted nonetheless that, owing to the deliberate reduction in some of their trading activities as part of their de-risking strategies, Belgian banks have not been able to benefit fully from the recovery observed in the markets worldwide.

Net fee and commission income also remained weak in 2009, decreasing by 16.8 p.c. compared to 2008, especially as regards fees and commissions received for securities and brokerage activities, clearing and settlement business, and asset management services.

The other components of non-interest income, such as dividend income, exchange differences and gains on derecognition of assets other than held for sale, decreased as well.

Total operating expenses decreased in 2009 by 12 p.c., primarily owing to a reduction in staff expenses. General and administrative expenses also declined, as a consequence of efforts by banks to improve their efficiency ratios. The cost/income ratio of the Belgian banking sector decreased from 86 p.c. in 2008 to 78 p.c. in 2009, but remains well above its 2007 level (61 p.c.).

CHART 22 LOAN LOSS RATIO (1)
(consolidated data, 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 are the loan loss ratio for the IAS / IFRS category Loans and receivables.

Net impairments on assets Available for sale, a major source of impairments in 2008, contributed positively to net operating income in 2009, since reversals of previous impairments outweighed new impairments, partly as a result of one major institution transferring impaired assets to a defeasance vehicle. In contrast, impairments on Loans and receivables climbed to historically high levels. The related loan loss ratio thus reached 83 basis points at the end of 2009, more than double the 2002 and 2008 figures, even though provisions in those two years were higher than average (Chart 22). Loan loss provisions were especially sizeable in the last quarter of 2009, when they reached 2.5 billion euro, to total 5.6 billion for the year as a whole. This increase in the last quarter of the year was partly seasonal, since loan portfolios are usually more extensively re-evaluated at the end of each year, as can be seen in Chart 20, presenting various income sources and costs on a quarterly and non-cumulative basis. Yet, the 2009 figures were also affected by the impairments taken on debt securities henceforth recognised in the Loans and receivables portfolio due to earlier reclassifications. Finally, other impairments were still considerable as impairments on goodwill, for instance, amounted to 0.6 billion euro.

2.3 Asset quality and credit risk

The amount of loan impairments is related to changes in both the percentage of impaired claims and the provisioning rate, i.e. the percentage of impaired claims covered by loan loss provisions.

The percentage of impaired claims increased sharply in 2009, with some signs of stabilisation in the last quarter, reaching 3 p.c. of the total outstanding amount of loans granted at the end of the year (Table 5). The increase was particularly strong for loans granted to the corporate sector, where the ratio jumped from 2.4 p.c. at the end of 2008 to 4.4 p.c. It must, moreover, be noted that this figure does not cover all the loans that were renegotiated to avoid impairments, limiting the increase in impaired loans as a percentage of total loans. Other renegotiations may nonetheless also have led to impairments when the amount of the loan principal or the interest rate applied was reduced as part of the debt restructuring.

In comparison to 2008, the total coverage ratio increased somewhat, masking opposing movements in the various loan categories. While the ratio increased for retail loans, it decreased for all the other loan categories. Although these developments in the coverage ratios may be justified by the presence of sufficient collateral in the new impaired loans, they require careful monitoring since a shortage of provisions could later have repercussions on the profit and loss account.

As regards the deterioration in the credit quality of the portfolio of loans granted to the non-financial private sector, a distinction should be made between credit extended to domestic residents (where the deterioration has been moderate, at least up to the end of 2009) and non-domestic residents.

TABLE 5 LOAN PORTFOLIO BREAKDOWN AND CREDIT QUALITY INDICATORS

(consolidated data, billion euro, unless otherwise stated)

	Total loans			Impaired claims (1)			Coverage ratio (2)		
	2007	2008	2009	2007	2008	2009	2007	2008	2009
Credit institutions	320.8	213.2	156.1	0.0	0.4	0.8	59.0	68.2	47.7
Corporate (3)	313.5	290.7	244.4	2.3	2.4	4.4	37.2	47.1	46.0
Retail (4)	276.2	208.0	237.4	2.8	3.4	3.6	27.6	33.6	39.0
Non-credit institutions (5)	60.1	43.5	40.3	0.3	1.3	0.3	31.9	19.9	17.9
Total (6)	**987.0**	**768.7**	**692.6**	**1.6**	**2.0**	**3.0**	**32.3**	**41.1**	**43.0**

Sources: CBFA, NBB.
(1) Impaired claims (according to IAS 39 definition) as a percentage of total loans.
(2) Percentages of impaired claims covered by specific or general provisions.
(3) Exposures on non-financial corporations, plus some non-bank financial corporations.
(4) Including self-employed persons and some SMEs.
(5) Exposures on certain non-bank financial institutions and local authorities.
(6) Including the small amounts of loans to central governments.

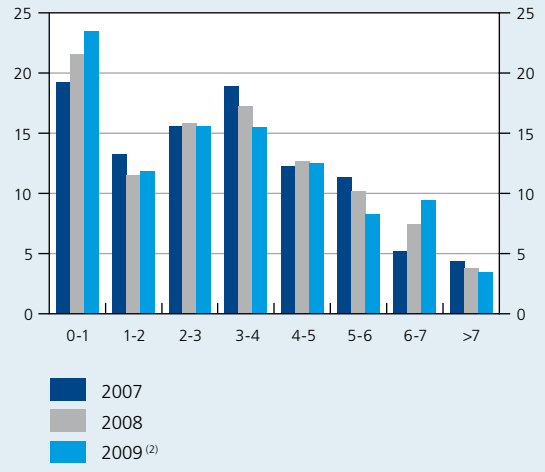
In the case of Belgian non-financial corporations, this relatively favourable loan loss situation can be attributed partly to the still solid solvency ratios of the sector, as highlighted in section 1 (Chart 9), and Belgian corporations' more moderate indebtedness if compared to the European (or euro area) average. The unprecedented deterioration in the economic environment nonetheless resulted in a significant increase in the number of corporate bankruptcies in Belgium, which increased by 11.1 p.c. in 2009 relative to 2008. As a result, the bankruptcy rate reached 1.23 p.c. However, the exposure of the Belgian banks to the corporations most at risk of default seems to have been proactively reduced in the period 2008-2009. These developments are reflected in the so-called debt-at-risk measure of the quality of the Belgian banks' loans extended to domestic non-financial corporations. This measure links the outstanding amounts of bank credit to individual non-financial corporations from the NBB's Central Credit Register with an update of their projected individual three-year cumulative bankruptcy rates on the basis of data in the NBB's Balance Sheet Register and a proprietary probability-of-bankruptcy forecast model.[1] The main caveat related to the use of this tool is the time necessary to obtain Balance Sheet Register data for the whole population of non-financial corporations, for which the last currently available data ends in 2008. In consequence, for both 2009 and 2008, the estimated bankruptcy rates in Chart 23 are based on 2008 data from the Balance Sheet Register. The chart nonetheless shows that, between 2008 and 2009, lending by Belgian banks shifteds to non-financial corporations associated with lower estimated probabilities of bankruptcy. The proportion of loans granted to corporations with a higher probability of bankruptcy was reduced, if we except the corporations with a probability of default between 6 and 7 p.c., where the outstanding amount of loans has been influenced by one major contract.

As regards loans to Belgian households, consumer and mortgage loan vintages showed no signs of a marked deterioration in the proportion of loans with payment defaults (Chart 24). Vintages group together all loans granted during a particular year. For a specific number of months after the loans have been granted (see x-axis), the curves referencing the loans originated in 2007 and 2008 tend to adopt a profile only slightly steeper than those of the previous vintages. Hence, for consumer loans, 12 months after the loan was granted, the percentage of defaulted loans is a bit higher for the 2008 vintage than for the 2007 and 2006 vintages. After 24 months, the curve showing the default experience of the 2007 vintage is slightly higher than the corresponding curve for the 2006 vintage. The trend is more mixed for mortgage loans, the 2008 vintage showing less defaults than the 2007 vintage after 12 months.

As shown in the lower panel of Chart 24, the number of defaulted loans outstanding increased in 2009 and at the beginning of 2010 in the same proportion as the total number of loans – both by a bit more than 3 p.c. in 2009 and by an additional 1 p.c. during the first quarter of 2010 – amplifying a trend that started in 2008 but contrasting with previous years when the number of defaulted loans was decreasing or stable while the total number of loans constantly increased. In addition, among the stock of defaulted loans, while the number of loans that have been regularised decreased, the number of unregularised loans increased. This suggests that, while there was no marked deterioration, the quality of the loans granted to Belgian households stopped improving in 2008 and – to an even greater extent – in 2009, in contrast to previous years.

CHART 23 FREQUENCY DISTRIBUTION OF LOANS GRANTED TO BELGIAN NON-FINANCIAL CORPORATIONS, ACCORDING TO PROJECTED BANKRUPTCY PROBABILITIES[1]

(territorial data, percentages)



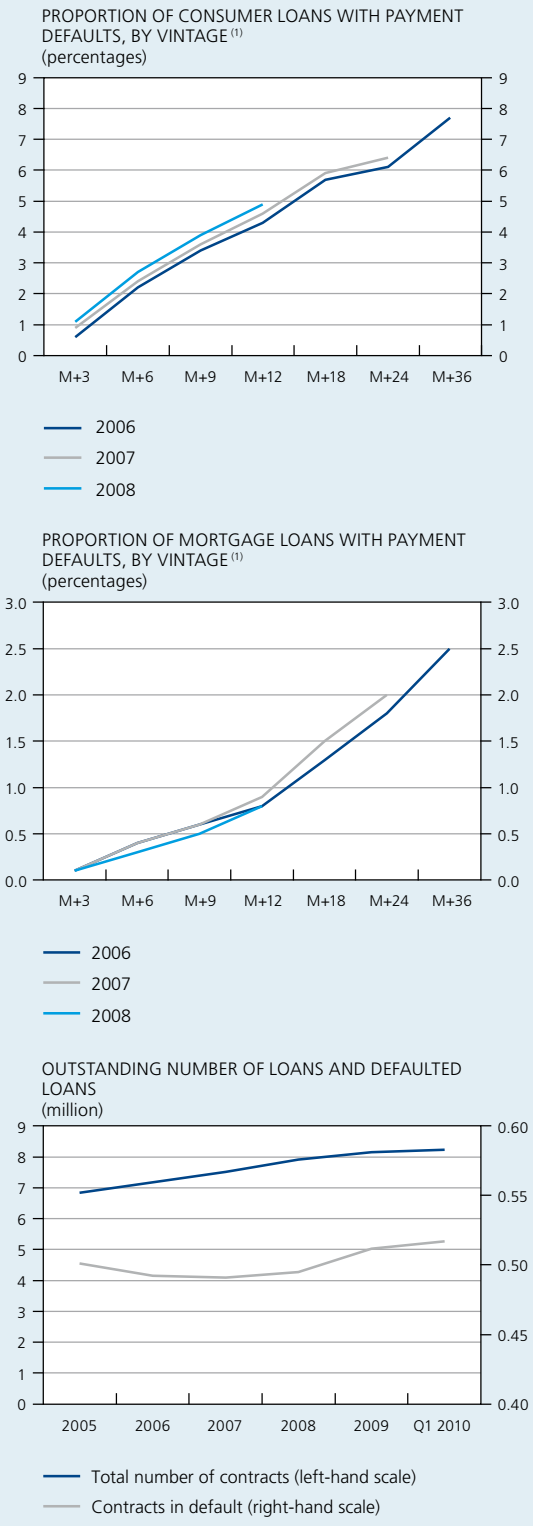
Source : NBB.

(1) Only for non-financial corporations with a bank loan outstanding in the Central Credit Register. The value 1-2 on the x-axis indicates that the companies within this range have an estimated three-year cumulative probability of bankruptcy equal to or higher than 1 and lower than 2 p.c.

(2) The 2009 figure combines the cumulative probabilities of bankruptcy in 2008 with the exposures in 2009.

(1) For more detailed information about this model, see the article in the 2007 FSR "A survey of failure prediction models offered by vendors with an application to Belgian data". This model is based on various financial ratios, mainly reflecting corporations' liquidity and solvency position.

CHART 24 CREDIT QUALITY INDICATORS FOR LOANS GRANTED TO BELGIAN HOUSEHOLDS

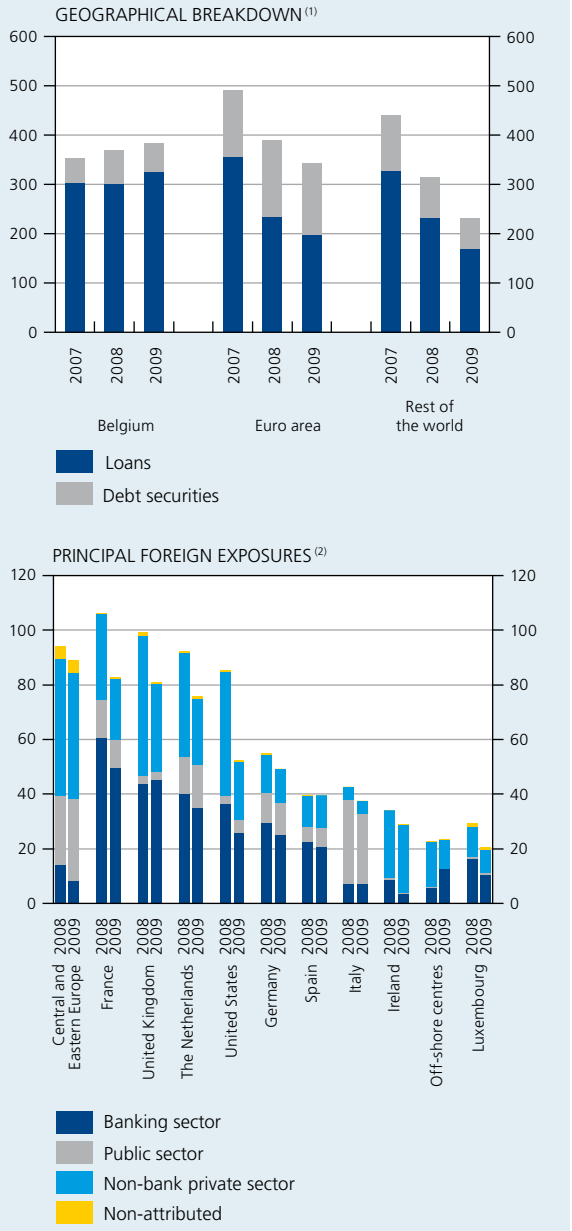


Source : NBB.

(1) Vintages group together loans granted during the same year. The curves show, for each vintage, the number of defaulted loans as a percentage of total original loans after a certain number of months since the loans were granted. Possible regularisations of loans are not taken into account.

CHART 25 GEOGRAPHICAL BREAKDOWN OF ASSETS HELD IN THE FORM OF LOANS AND DEBT SECURITIES

(consolidated data, billion euro)



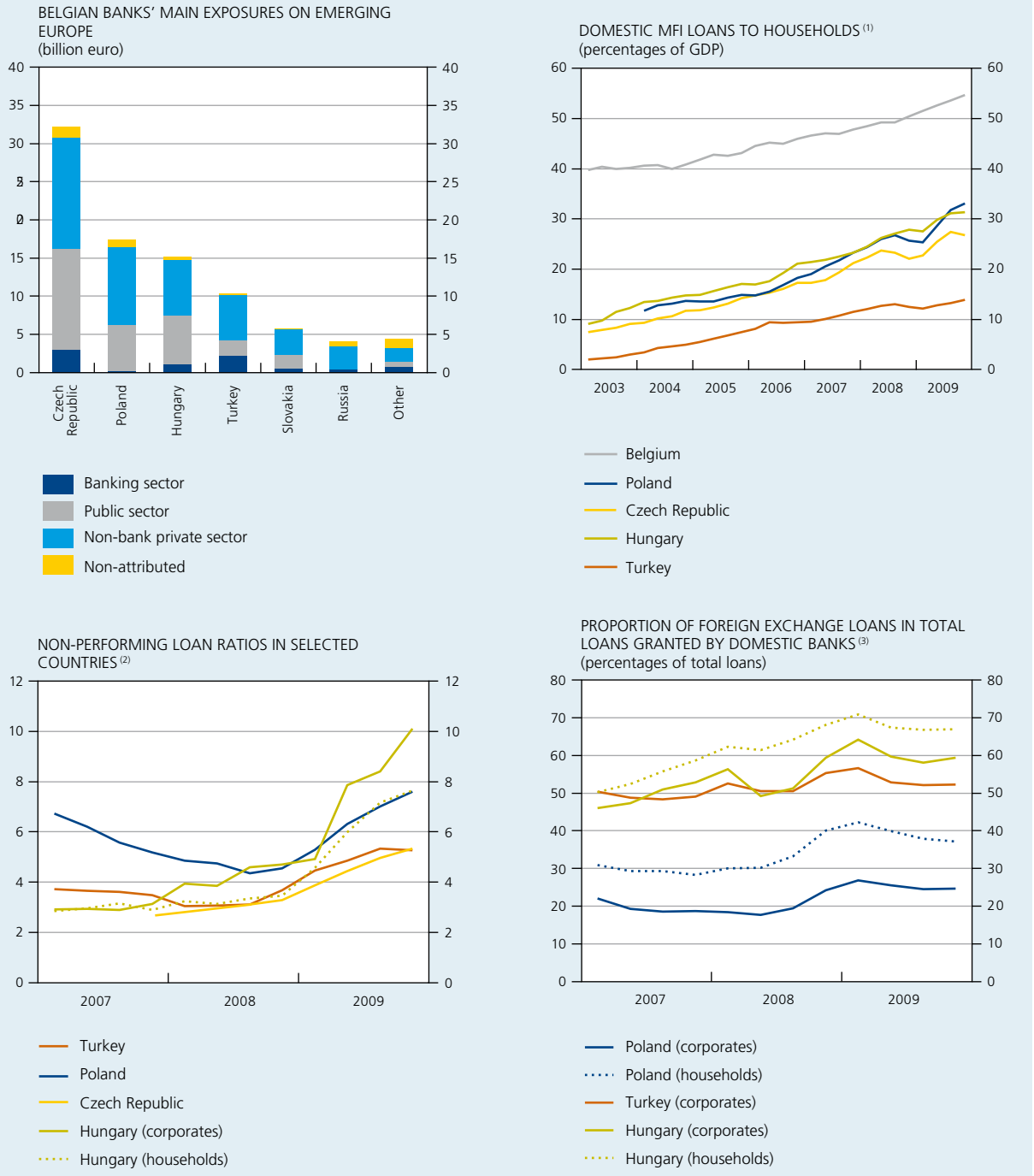
Sources : CBFA, NBB.

(1) Data from reporting to the CBFA on a consolidated basis by Belgian credit institutions. Breakdown as reported in the FINREP supervisory reporting scheme.

(2) Breakdown as reported in the International Consolidated Banking Statistics reporting scheme. The data are compiled in accordance with the Belgian accounting standards (Belgian GAAP). The assets are broken down on the basis of ultimate risk, i.e. after risk transfers.

Loans to Belgian residents only account for 34.1 p.c. of the total credit risk exposures assumed in the form of loans and debt securities, which total 957.2 billion euro (Chart 25). Loans to foreign counterparties and exposures through debt securities portfolios represent respectively

CHART 26 EXPOSURES ON EMERGING EUROPE AND RELATED CREDIT RISK INDICATORS



Sources: CBFA, ECB, Turkish Banking Regulation and Supervision Agency, Turkish Statistical Institute, Czech National Bank, Czech Statistical Office, National Bank of Poland, Central Statistical Office of Poland, Magyar Nemzeti Bank, Hungarian Central Statistical Office, NBB.
(1) Data include only loans granted by domestic monetary financial institutions (MFIs). For Belgium, debts vis-à-vis foreign MFIs are also taken into account.
(2) NPL ratios are calculated for exposures on the private sector except for Turkey where a global NPL ratio is calculated.
(3) Foreign exchange loans are a very low share of total loans in the Czech Republic.

38.3 p.c. and 27.7 p.c. The geographical composition of credit exposures has been rebalanced during the last two years by the combination of a sharp reduction in loans and debt securities for which the counterparty is a non-resident with a small increase in exposures to Belgian residents.

Even though claims on foreign counterparties have thus decreased as a whole, they still outweigh exposures to residents and these international portfolios were the main source of credit losses in the last three years. Besides substantial exposures to the banking sector in France, the UK, the Netherlands, the US, Germany and Spain, the Belgian banks' main exposures to the public sector are vis-à-vis Italy, the Netherlands, the Czech Republic, Germany and France. Exposures to the non-bank private sector are also quite significant. They include exposures via loans, debt securities or structured finance instruments on the private sector of countries such as the United Kingdom, the United States, France and the Netherlands but also important exposures on counterparties located in Central and Eastern Europe and Ireland, where some Belgian banks are present through subsidiaries or branches (lower panel of Chart 25).

The three major Belgian banks have each developed a strategic presence in Central and Eastern Europe (including Turkey) which they consider as core markets. So Fortis Bank has subsidiaries in Poland (Fortis Bank Poland and Dominet) and Turkey (Fortis Bank Turkey) while KBC is present in Central and Eastern Europe (mainly CSOB in the Czech Republic and Slovakia, K&H in Hungary, Kredytbank in Poland and Absolut Bank in Russia). Like Fortis Bank, Dexia group is active on the Turkish market via its subsidiary Denizbank. Non-performing loan ratios in these markets increased rapidly in 2009 (Chart 26), as the economic performance of these countries was hit by the collapse of international trade and reduced capital inflows.

Economies that weathered the global crisis relatively well, such as Poland, are projected to rebound more strongly than the economies that faced the crisis with large current account deficits and vulnerable private or public sector balance sheets. This varying strength of the economic recovery is likely to remain an important driver of credit risk in emerging Europe in the period ahead, with potential risks related to loans in foreign currency being a particular point of attention in some of them.

While most credit risks in the Belgian banking sector stem from exposures on the balance sheet, off-balance-sheet exposures in the form of undrawn portions of credit lines, or guarantees extended to third parties in the case of derivatives, may also be a source of sometimes significant credit risk. To calculate the Basel II capital requirements for credit risk, the on- and off-balance-sheet exposure are

TABLE 6 EXPOSURES FALLING UNDER THE IRB APPROACHES OF THE PILLAR I CAPITAL REQUIREMENTS FOR CREDIT RISK

(consolidated data for the four main banking groups at the end of 2009)

	Exposure at default (EAD) (billion euro)	Minimum capital requirement (p.c. of EAD)	Probability of default higher than 2 p.c. (p.c. of EAD)	Average estimated loss given default (percentages)
Central governments and central banks[1]	185.5	0.2	0.1	24.4
Institutions[2]	287.0	1.0	1.7	21.1
Credit institutions and investment firms	261.9	1.0	1.7	22.5
Other	25.1	0.4	2.3	6.1
Corporates[3]	308.4	3.9	17.4	32.4
SMEs	45.5	4.5	26.3	34.9
Other	262.9	3.8	15.9	31.9
Retail[4]	178.4	1.5	22.1	17.0
Secured by real estate	118.9	1.3	20.7	11.9
Qualifying revolving	1.3	1.0	10.0	49.8
Other	58.2	1.9	25.3	26.7

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, commodity 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) In the retail asset class, 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.

combined and converted to exposure at default (EAD) via a process which is explained in last year's Financial Stability Review (pp. 44-49). In turn, this EAD is risk-weighted and translated into capital requirements, serving as buffers against unexpected credit losses. These calculations differ significantly between the standardised (SA) and internal ratings-based (IRB) approaches.

Table 6 highlights for each type of asset class recorded in the IRB portfolios of the four biggest Belgian banking groups the total amount of EAD in absolute terms and the total minimum required capital – resulting from the IRB calculations – as a percentage of the total amount of EAD (which is equivalent to an exposure before risk weighting). It shows as well the percentage of total EAD having a probability of default (PD) within a one-year horizon of more than 2 p.c. and, finally, the average loss-given-default (LGD) for each asset class, which is the fraction of the EAD that cannot be recovered upon default. Collateral can be taken into account in the calculation of LGD.

Minimum capital requirements as a percentage of EAD differ significantly between the different asset classes, owing to differences in assessed probabilities of default and correlations between potential defaults as well as the availability of collateral to secure credit exposures. The minimum capital requirements as a percentage of the non-risk-weighted EAD are lowest for the asset class central governments and central banks (at 0.2 p.c.) and the highest for the asset class SMEs (at 4.5 p.c.).

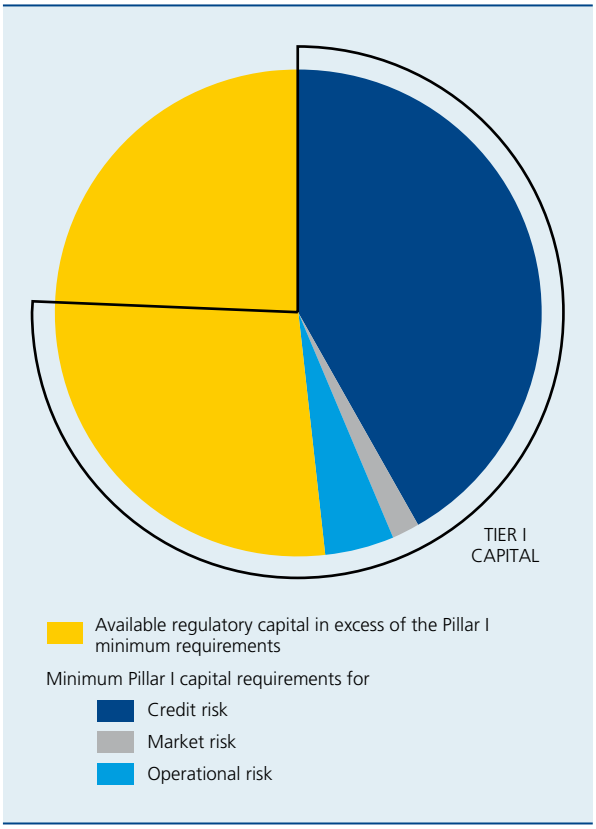
The third column of the Table gives the percentages of EADs that are associated with a probability of default higher than 2 p.c., within a one-year horizon. For central governments and central banks, only 0.1 p.c. of the EAD have an internal PD of more than 2 p.c. This helps to explain why the capital requirements are very low for this asset class. The estimated probability of default is low also for institutions including regulated banks and local authorities, as only 1.7 p.c. of exposures have a PD of more than 2 p.c. Corporate exposures bear more credit risk, as 17.4 p.c. have a PD which exceeds 2 p.c. In 2008, this percentage amounted to 14.1. This adverse rating migration highlights the impact of the economic recession on the internal ratings of Belgian banks' corporate debtors. A similar rating migration took place in the retail asset class (which includes exposures to retail SMEs), with an increase in the percentage of EAD with a PD of at least 2 p.c. from 20.2 p.c. at the end of 2008 to 22.1 p.c. at the end of 2009. The LGD levels declined for all asset categories, except for the retail exposures secured by real estate and the asset class central governments and central banks.

2.4 Liquidity and interest rate risk

Besides credit risk, 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 framework do not (and are not intended to) provide an all-encompassing quantification of the banks' risk exposures. In addition to credit risk, they cover market risk in the trading book and operational risk (Chart 27). 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 in the banking and trading books. 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.

CHART 27 BREAKDOWN OF AVAILABLE REGULATORY CAPITAL

(consolidated data at the end of 2009)



Sources: CBFA, NBB.

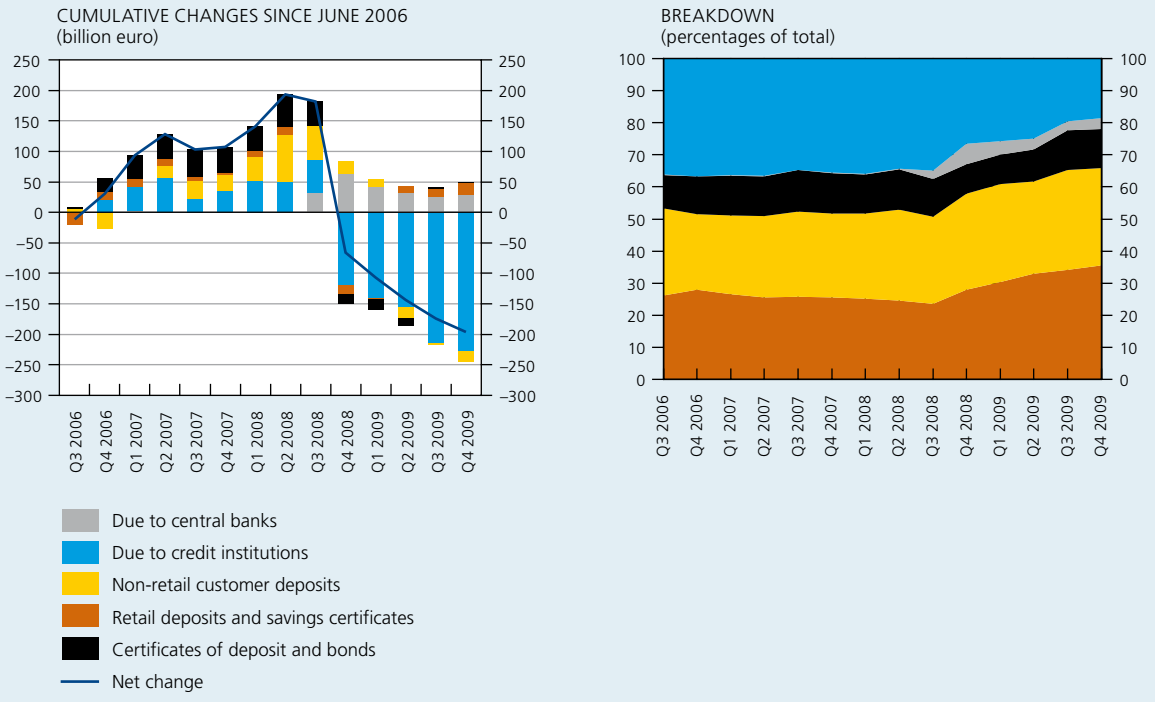
Two main sources of risk not covered in Pillar I are liquidity risk and interest rate risk in the banking book. In order to complement the risk assessments performed in Pillar I, banks are thus required to develop, in the context of Pillar II, an Internal Capital Adequacy Assessment Process (ICAAP).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

2.4.1 Liquidity risk

The failure of Lehman Brothers in September 2008 was followed by a significant tightening of funding and market liquidity conditions and constituted a main channel for the transmission of stress in the financial system. The powerful deleveraging forces and severe disruption in wholesale financing markets in the weeks following the failure of Lehman Brothers also put severe pressure on the liquidity position of Dexia and Fortis, as counterparties did not (re)finance maturing wholesale funding or withdrew deposits. Together with the deconsolidation of Fortis Bank Nederland, this resulted in major changes in the outstanding amounts of Belgian banks' liabilities in the fourth quarter of 2008. The left panel of Chart 28 shows the cumulative changes in a number of liability components since the end of June 2006, and highlights the sharp drop in interbank financing during the last quarter of 2008, which was only partly compensated by increased financing via central banks, starting in the last week of September 2008. Outstanding amounts of other forms of wholesale financing, such as non-retail customer deposits, certificates of deposits and bonds, also declined significantly during this period.

Since the end of 2008, the funding structure of Belgian banks has been rebalanced. Financing by central banks has declined, but remains 30 billion euro higher than in June 2008 or June 2006. At the end of 2009, only interbank debts (–228 billion euro) and non-retail deposits (–18 billion euro) remained lower than in June 2006, highlighting the decreased reliance of the Belgian banking sector on wholesale funding. This primarily reflects reduced financing needs, as the sector's balance sheet total has declined by 523.1 billion euro since June 2008. While the

CHART 28 DEPOSITS COLLECTED AND SECURITIES ISSUED BY BELGIAN BANKS
(consolidated data)



Sources: CBFA, NBB.

outstanding amount of retail deposits was affected by the deconsolidation of Fortis Bank Nederland, the Belgian banking sector succeeded in increasing the amount of these deposits in 2009, on the back of a 34.3 billion euro rise in savings deposits and a 9.0 billion rise in savings certificates (*bons de caisse* / *kasbons*). Between the end of June 2008 and the end of last year, retail deposits and savings certificates' share in total deposits collected and securities issued increased from 24.5 p.c. to 35.6 p.c., while the non-retail customer deposits increased over the same period by only 1.8 percentage point to 30.2 p.c. (Chart 28, right-hand panel).

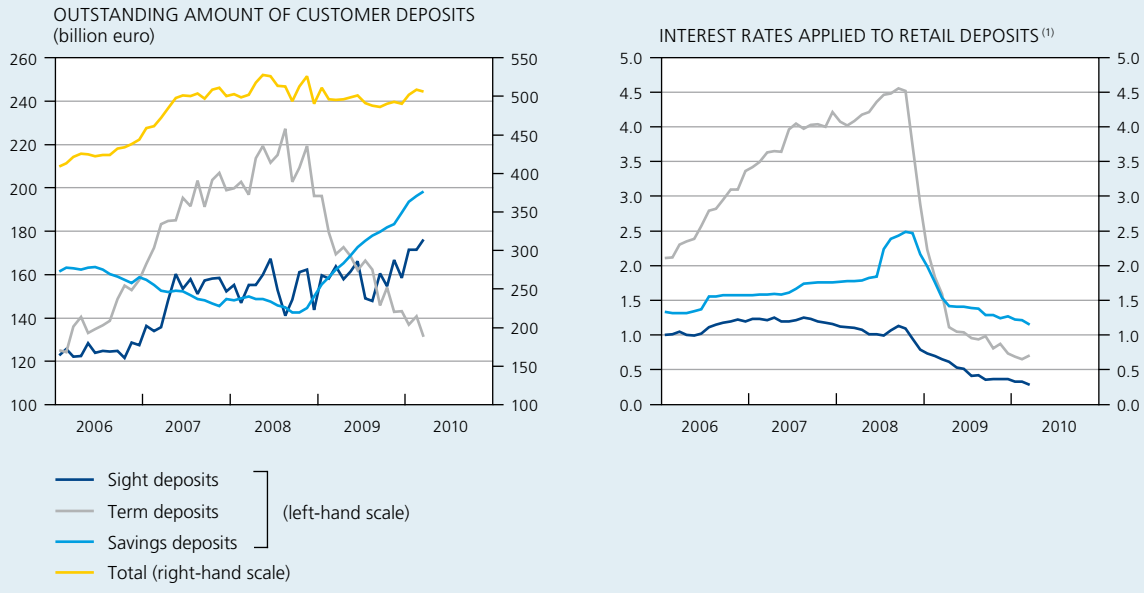
Within these customer deposits, some notable changes took place during the period under review (Chart 29). Significant changes in the remuneration of the different types of deposits have in fact driven large reallocations between term and savings deposits since the middle of 2006. Between 2006 and the 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 2009, the positive gap between the remuneration of term and savings deposits quickly disappeared and turned negative, as term deposit rates dropped in line with the sharp decline in market interest rates while savings deposits yields were adjusted to a much lesser extent due to their institutional characteristics, which are described in Box 14 of the Bank's Annual report 2009. This led to a strong increase in savings deposits at the expense of term deposits.

With a decline of 62 p.c. since June 2008, the bulk of the balance sheet deleveraging has been realised, on the liabilities' side of the balance sheet, by a reduced recourse to interbank financing, which proved to be a major channel of contagion in the aftermath of the failure of Lehman Brothers. The relative share of interbank deposits in the total deposits collected and securities issued fell to 18.5 p.c. as at the end of 2009, versus 34.4 p.c. in June 2008 (Chart 28, right-hand panel).

Belgian banks' issues of debt certificates, which they had used to fund their expanding balance sheet in the pre-crisis period, fell from 162.9 billion euro at the end of June 2008 to 94.5 billion at the end of 2008. However, the outstanding amount of these liabilities had increased again to 111.2 billion euro by the end of 2009. This increase was driven, in particular, by a rise of 15.9 billion euro in certificates of deposit. Overall, certificates of deposit and bonds still form a relatively small part of total funding.

CHART 29 CUSTOMER DEPOSITS: OUTSTANDING AMOUNTS AND INTEREST RATES APPLIED

(unconsolidated data, billion euro)



Sources: CBFA, NBB.

(1) Data from the monthly MIR survey in the case of new deposits. Deposits for a term of up to one year in the case of the term deposits.

Since 9 October 2008, Dexia has benefited from the several, but not joint, guarantee of the states of Belgium, France and Luxembourg covering some of its funding sources. This guarantee related in the first year to a total maximum amount of 150 billion euro and covered 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 were contracted, issued or renewed between 9 October 2008 and 31 October 2009. The states of Belgium, France and Luxembourg have mutually agreed with Dexia to renew the guarantee agreement relating to Dexia's funding until 31 October 2010. But the guarantee scheme was amended as follows: given the improvement in Dexia's liquidity situation, the cap on the guaranteed outstanding amount was lowered from 150 billion euro to 100 billion euro and the maturity of new long-term debts issued under the revised guarantee framework was extended to a maximum of four years. In addition, since 16 October 2009, Dexia has waived the benefit of the guarantee for all new contracts with a maturity below one month, and all new contracts with no fixed maturity.

From a peak of about 95 billion euro in the second quarter of 2009, the outstanding amount of Dexia liabilities covered by the state guarantees had fallen to 49 billion euro by 20 May 2010. In line with the agreements with the European Commission, full exit from short-term guaranteed contracts (less than one year) is expected to be achieved by the end of May, and from long-term contracts by the end of June 2010. The last contracts covered by the state guarantees are expected to expire in the course of 2014.

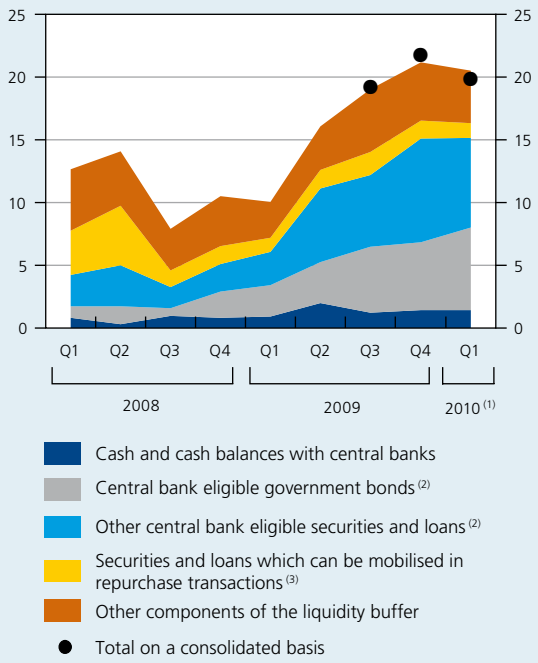
As a complement to the reduced reliance on wholesale sources of funding, Belgian banks have also taken steps to increase the stock of financial assets that can be used to generate liquidity. These efforts have focused primarily on increasing the relative importance of central bank eligible government bonds and other central bank eligible securities and loans (Chart 30). Together with cash holdings and cash balances with central banks, these assets represented around 15 p.c. of total assets at the end of 2009. Securities and loans which can be mobilised in repurchase transactions (which include the securities eligible at central banks other than the ECB, the Bank of England or the Swiss National Bank) and the other components of the unencumbered liquidity buffer, account for an additional 5 p.c. of total assets.

In its December 2009 consultation paper, the Basel committee envisaged the possibility to set two quantitative limits to improve both the short-term and long-term resilience of financial institutions to liquidity shocks. A first proposed measure, the *liquidity coverage ratio*, obliges the banks to ensure that they have a sufficiently large high quality liquidity buffer to withstand a crisis which severely restricts their scope for refinancing liabilities maturing within thirty days. Such a measure concerning short-term liquidity risks is accompanied by a second proposed measure, the *net stable funding ratio*, which caps the mismatch permitted over a long period between funding sources regarded as stable, on the one hand, and illiquid assets and potential liquidity needs generated by off-balance-sheet liabilities, on the other hand.

In response to the crisis and to international consultations among supervisors, the CBFA, like some of its foreign counterparts, is further developing its prudential approach to liquidity risk. In May 2009, a new circular on liquidity risk management was published. Specifically, the CBFA 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

CHART 30 STOCK OF LIQUID ASSETS

(unconsolidated data unless otherwise stated, percentages of total assets)



Sources: CBFA, NBB.

(1) End March 2010 data for the unconsolidated basis. End February 2010 data for the consolidated basis.

(2) Bonds, securities and loans eligible at the ECB, the Bank of England or the Swiss National Bank.

(3) Including the securities eligible at central banks other than the ECB, the Bank of England or the Swiss National Bank.

position of the institutions concerned is resilient 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 cover 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 serve as the basis for a robust dialogue between the CBFA and the institutions concerning their liquidity position. In addition, the new circular also updated 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 intensified the monitoring of liquidity positions by increasing the frequency of existing liquidity reporting and reducing the deadline for the submission of these reports. The CBFA evaluated the impact of these measures during the last quarter of 2009 in the context of the economic developments and the state of play regarding the forthcoming Basel proposals on common liquidity metrics, and is now considering and consulting on the introduction of binding liquidity ratios based on the aforementioned stress test observation ratios on a path of convergence towards the introduction of the internationally harmonised liquidity standards that are under development.

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 between their assets and liabilities is interest rate risk. As intermediaries 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. Banks can, however, 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.

In general, there are four different drivers of interest rate risk : parallel shifts in the yield curve, changes in the slope of the yield curve, basis (spread) risk which arises from imperfect correlations between rates earned and paid on instruments with similar maturities and re-pricing characteristics, and optionality, implying that behavioural maturities can differ from contractual ones. Two examples of such optionality are the pre-payment options in mortgage contracts and the withdrawal options in sight and savings deposits. These withdrawal options in the case of sight and savings deposits lead to important differences between the contractual and behavioural maturities of non-maturity deposits, which constitute an important element in the management of the Belgian banks' interest rate risk.

These drivers can affect the profitability and solvency of financial institutions through different channels. First, changes in market interest rates affect the net interest income realised. Second, they also affect the economic value of assets and liabilities, with changes in the economic value of assets and liabilities Held for trading and Designated at fair value through profit and loss having an immediate impact on profitability, while only affecting accounting equity in the case of assets Available for sale. Finally, changes in interest rates can result in indirect losses related to interactions between interest rate risks and credit risks or market risks.

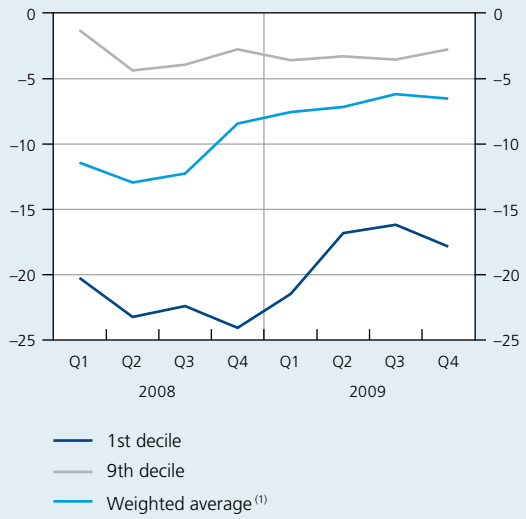
The regulatory environment makes a distinction between interest rate risks in the banking book and those in the trading book. Whereas interest rate risks in the trading book are treated under Pillar I of the Basel II capital accord, explicitly requiring capital to be held to cover them, interest rate risks on banking book assets are currently treated as a Pillar II risk. This Pillar II risk measure is defined in terms of the impact, on the economic value of the banking book – namely the difference in net present value of assets and liabilities not belonging to the trading book –, of a parallel shift in the yield curve.

Belgian banks report, 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 the reporting date under six uniform assumptions 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 – for prudential reporting purposes only – of uniform assumptions imposed by the regulator regarding re-pricing dates of savings deposits and sight deposits.

Chart 31 shows the development over time of the sensitivity of the economic value of the banking book to a scenario of a 200 basis point parallel rise in the yield curve. It suggests that interest rate risk in the banking book was considerably reduced in the course of 2009. For the weighted average

CHART 31 IMPACT OF A 200 BASIS POINT PARALLEL UPWARD SHIFT IN THE YIELD CURVE ON THE ECONOMIC VALUE OF THE BANKING BOOK

(consolidated data, percentages of regulatory own funds)



Sources: CBFA, NBB.

(1) The 1st decile gives the impact on economic value for the institution that ranks on the 10 p.c. percentile. The 9th decile gives the impact on economic value for the institution that ranks on the 90 p.c. percentile. The weighted average divides the impact on the economic value of the sector as a whole divided by the regulatory funds of the sector as a whole.

of the Belgian banking sector, the impact, measured as a percentage of the sum of Tier I and Tier II capital, has remained well below the 20 p.c. threshold that is destined to trigger heightened supervisory attention for individual banks as suggested in the Basel II Pillar II guidelines regarding the supervisory review process. However, sensitivity to interest rate risk differs widely among institutions as emphasised by the first and ninth deciles.

It should also be recalled that this measure only captures the first of the four different drivers of interest rate risk, i.e. a parallel yield curve shift, under a specific set of assumptions concerning such factors as the optionality. It therefore does not reflect the impact of potential changes in the slope of the yield curve, spread changes and changes in behavioural maturities and other optionalities.

3. Insurance sector

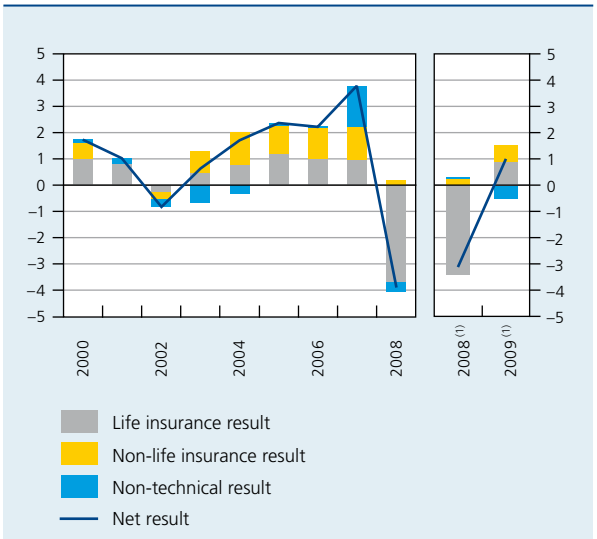
While Belgian insurance companies had incurred substantial losses as a result of the severe tensions on the financial markets during the second half of 2008, the increase in financial asset prices during 2009 restored their profitability (Chart 32). Although the increase in the net result of non-life insurance activities contributed to that recovery, the conversion of a 3.9 billion euro loss in 2008 to a small profit of 1.0 billion in 2009 – on the basis of quarterly supervisory data reports for the latter year – mainly reflects the return to profitability in the life insurance segment.

In life insurance, the technical result normally combines a large negative underwriting result on actual insurance activities and a strong positive result on net investment income from assets attached to life insurance liabilities, as demonstrated by the annual average data for the period from 2003 to 2007 (Table 7). Financial investment income averaged 6.6 billion euro during these years. That financial income is derived essentially from investments based on premiums collected by insurance companies, invested in financial assets in order to generate additional income for policyholders until the contracts mature. Variations in the technical reserves that result from those additional liabilities of insurance companies vis-à-vis their policyholders are deducted from the amount of premiums collected during the year in order to obtain the other component of the technical result, namely the result for underwriting activities, which – from 2003 to 2007 – averaged a negative amount of 5.7 billion euro.

In 2008, the technical result of life insurance activity was negative. That had also been the case in 2002, a year which ended with a loss of 0.2 billion euro on this item

CHART 32 NET RESULTS OF THE INSURANCE SECTOR

(unconsolidated data, billion euro)



Sources: CBFA, NBB.

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

TABLE 7 MAIN COMPONENTS OF THE PROFIT AND LOSS ACCOUNT OF INSURANCE COMPANIES

(unconsolidated data, billion euro)

	Annual average 2003-2007	2008	2009 (1)
Life insurance technical result	0.9	–3.7	0.9
Result of underwriting activities	–5.7	–0.3	–5.8
Net investment income	6.6	–3.4	6.7
Non-life insurance technical result	1.1	0.2	0.6
Result of underwriting activities	–0.2	0.0	–0.4
Net investment income	1.3	0.2	1.0
Non-technical result (2)	0.2	–0.4	–0.6
Net investment income	0.6	0.3	–0.7
Other results	–0.4	–0.7	0.2
Net result for the financial year	**2.1**	**–3.9**	**1.0**

Sources: CBFA, NBB.

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

(2) The non-technical result includes investment income not attributed to life and non-life activities, and exceptional income and taxes.

following the slump in stock market prices. Yet the impact of the financial crisis was far more severe in 2008, since the deficit came to 3.7 billion, owing to the steep fall in prices of fixed-income financial instruments other than government securities. These instruments represent a far larger share of the investment portfolio allocated to the technical reserves of life insurance activities than equity instruments.

As shown in the Table, the asset price recovery during 2009 has restored a more traditional balance between the net income from financial investments in life insurance activities (6.7 billion euro) and the negative result on insurance activities (–5.8 billion), so that life insurance activities once again produced a positive technical result of 0.9 billion euro.

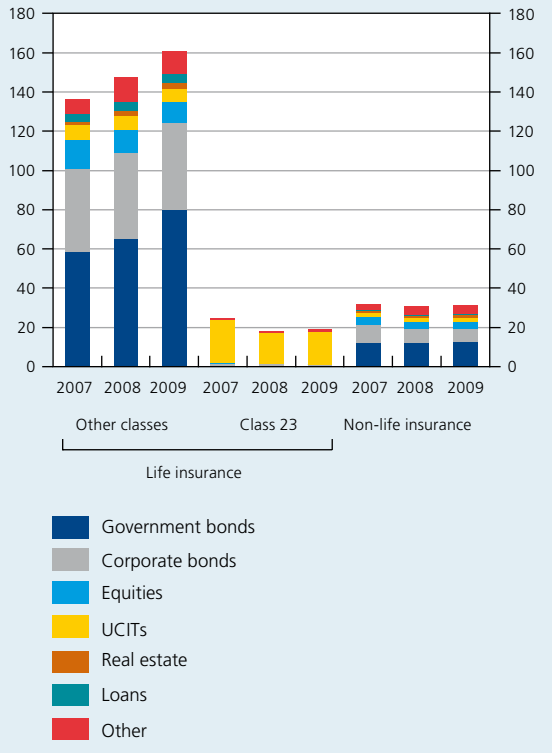
Life insurance activities are generally much more sensitive to financial market developments than non-life insurance business. The main reason lies in the larger amounts of the technical reserves and the covering assets intended to honour future liabilities towards life insurance policyholders. The fact that non-life activity is less dependent on financial investments explains why developments on the financial markets in 2008 and 2009 had less impact on the non-life technical result.

In terms of risks, it is important to distinguish between two types of contract in life insurance. Life insurance policies with variable capital, better known as class 23 products, are comparable to mutual investment funds, since the policyholders/investors bear all the investment risks. Although these contracts do not entail any market risk for companies, they may imply a reputational risk if the investments perform badly. In terms of outstanding amounts, the assets corresponding to these contracts represent about 10 p.c. of the total assets covering life insurance contracts (Chart 33). The breakdown of the assets covering class 23 contracts confirms that these are invested mainly in Undertakings for Collective Investment Trusts (UCITs).

Most other life insurance contracts – predominantly class 21 policies – entail a market risk for the companies, as they offer policyholders a guaranteed rate of return. That is generally accompanied by a profit-sharing mechanism which, in principle, does not imply any market risk but does involve a commercial risk.

CHART 33 COMPOSITION OF THE COVERING ASSETS PER INSURANCE ACTIVITY

(unconsolidated end-of-period data, billion euro)



Sources: CBFA, NBB.

TABLE 8 COMPARISON OF THE MARKET VALUE AND BOOK VALUE OF THE INVESTMENT PORTFOLIO OF BELGIAN INSURANCE COMPANIES

(unconsolidated end-of-period data, billion euro)

	Difference between market value and book value						*p.m. Book value at the end of 2009*
	2008		2009				
	Third quarter	Forth quarter	First quarter	Second quarter	Third quarter	Forth quarter	
Real estate	1.5	1.2	1.2	1.2	1.1	1.1	*3.1*
Participations in associated companies	0.8	0.8	0.4	0.8	1.0	1.3	*17.1*
Equities	–1.5	–1.8	–1.6	–0.9	0.2	0.4	*11.3*
Bonds	–5.8	–1.5	–2.5	–0.3	4.3	3.1	*150.9*
Other	0.2	0.4	0.4	0.3	0.3	0.3	*12.5*
Total	**–4.8**	**–0.9**	**–2.2**	**1.0**	**6.9**	**6.2**	***194.9***

Sources: CBFA, NBB.

To cover the financial risks associated with this second category of contracts, insurance companies diversify their assets. Those assets consist mainly of corporate and government bonds, which represented 49.8 and 27.8 p.c. respectively of the portfolio at the end of 2009. At the end of 2008, the proportion of government bonds was around 5 p.c. lower. The proportion of the portfolio represented by equities, including participations in associated or non-associated companies, was down from 8.1 p.c. of the covering assets at the end of 2008 to 6.6 p.c. at the end of last year.

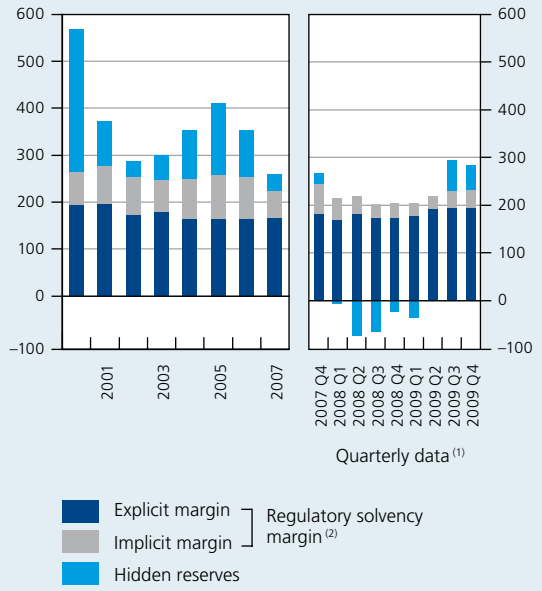
The exposure of the Belgian insurance sector to market risk was therefore even more concentrated on fixed-income instruments, making the sector more vulnerable to interest rate fluctuations and to changes in credit and liquidity risk premiums. Corporate bonds include structured finance products which, according to an analysis of a sample of large companies, represent less than 10 p.c. of the total investment portfolio. However, the turbulence which shook the international financial markets exerted considerable pressure on prices of structured products, and more generally, on those of all securities except for the safest assets.

The great sensitivity of the insurance companies' portfolio to fluctuations in fixed-income product prices is also illustrated by the wide variations recorded in the difference between the book value and the market value of the overall investment portfolio of these companies (Table 8). At the end of the third quarter of 2008, two weeks after the collapse of Lehman Brothers, Belgian insurance companies were recording unrealised losses on bonds totalling 5.8 billion euro. In the third quarter of 2009, the difference between the market value and the book value of the bonds returned to a positive figure of 4.3 billion, before declining to 3.1 billion at the end of the year. This positive development was due to a rise in the market value of fixed-income assets following the decline in risk-free interest rates and risk premiums, and to a downward adjustment in the book value of certain fixed-income products. That adjustment had taken the form of writedowns on financial assets, thus making a major contribution to the heavy losses on investments in 2008. The net changes in the unrealised losses on equities were also substantial, despite the relatively small size of those investments compared to the bond portfolio. Overall, taking into account the effect of writedowns as well, the sector recorded a sharp increase of 11.7 billion euro in the difference between the market value and the book value of its investment portfolio between the end of September 2008 and the end of September 2009. That increase also helped to improve the implicit solvency margin of insurance companies (Chart 34).

The required solvency margin comprises an explicit margin which includes own funds, subordinated debts and certain other balance sheet items, and an implicit margin which, subject to the approval of the supervisory authority (CBFA), comprises certain specific elements, the main one being a part of the unrealised gains on investment portfolios. As the explicit margin had to absorb – via a reduction in the capital reserves – the 3.9 billion net loss incurred by the insurance sector in 2008, a number of companies strengthened their capital in 2008 and in the first half of 2009. The total subscribed capital and issue premiums therefore

CHART 34 SOLVENCY MARGIN OF BELGIAN INSURANCE COMPANIES

(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.

increased by 5.3 billion euro between the end of 2007 and the end of 2009. That increase in the capital base enabled the sector to maintain an explicit solvency margin at least equal to 165 p.c. of the required minimum for each quarter from the end of 2007, with a level of more than 195 p.c. being attained in the second half of 2009.

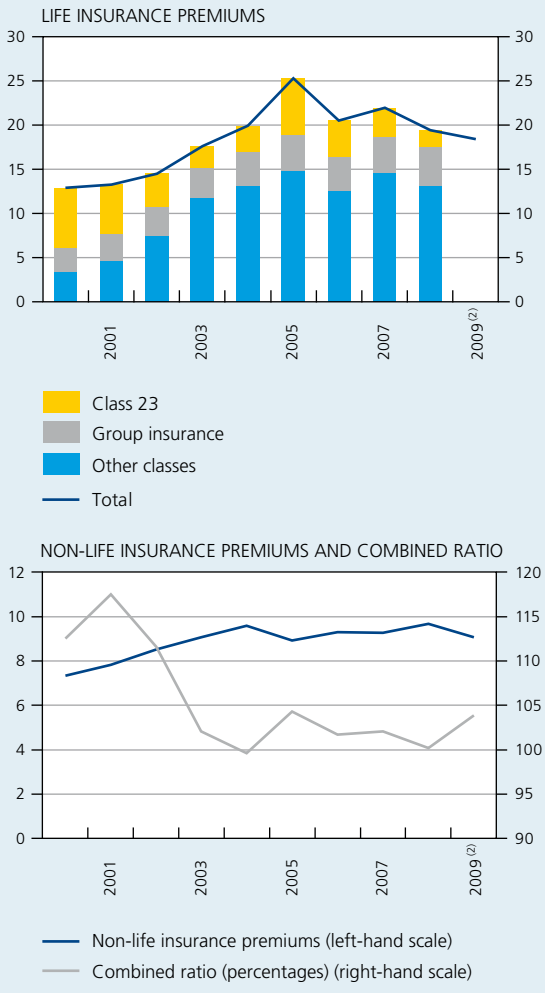
In parallel with the decline in unrealised gains on the investment portfolio, the relative size of the implicit margin in the required solvency margin diminished throughout 2008, and in the first quarter of the year under review. If account is taken of all unrealised gains or losses – including those that are not included by the CBFA as part of the implicit margin, in which case they form a hidden reserve –, it is evident that the additional solvency buffer due to the difference between the market value and the book value of the investment portfolio remained almost constantly negative from the second quarter of 2008 to the first quarter of 2009. The sum of the implicit margin and the hidden reserve then became positive again, thanks to the aforesaid increase in prices of financial assets, especially fixed-income securities.

The decline in investment returns affected not only the insurance sector's financial statements and solvency in the broad sense, but also the level of life insurance premium income (Chart 35, upper panel). During 2009, the total of those premiums was 5.5 p.c. down against 2008. That was due to a waning risk appetite among investors, in view of the uncertainty prevailing on the markets in 2009. That environment probably also induced customers to prefer policies offering a guaranteed rate of return (class 21).

The level of those guaranteed returns is a particularly important parameter for insurance companies when interest rates on risk-free products slump to very low levels, as

CHART 35 PREMIUM INCOME AND THE COMBINED RATIO (1)

(unconsolidated data, billion euro, unless otherwise stated)



Sources: CBFA, NBB.

(1) The combined ratio expresses the sum of insurance and operating costs as a ratio of net premium income.

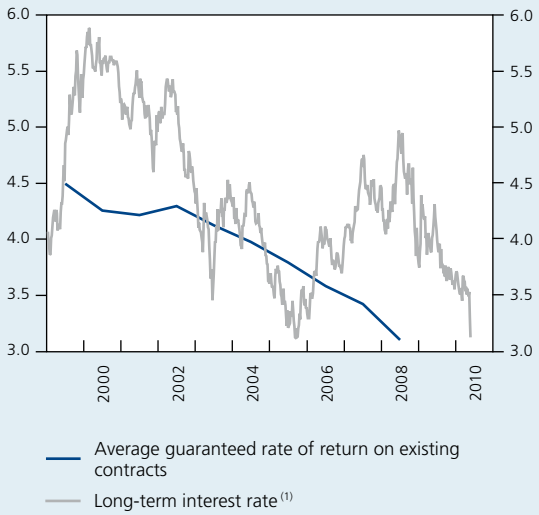
(2) Projection based on data for the first nine months.

they did in the year under review. In fact, such a development is liable to erode the profitability of some guaranteed yield contracts, as happened a few years ago when the returns promised on risk-free investments had fallen well below the statutory ceiling on the 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 modified that adverse structure by marketing contracts offering guaranteed yields which are more in line with risk-free interest rates and containing clauses which provide for revision on the basis of changing market conditions. These measures contributed to a reduction in the average guaranteed rate of return on class 21 contracts from 4.5 p.c. in 1999 to 3.1 p.c. in 2008 (Chart 36).

Although non-life insurance premiums are normally more stable, they were also affected by the financial crisis and its repercussions on economic activity in general, with premium income declining by 6 p.c. in 2009, as compared to 2008 (Chart 35, lower panel).

While an economic slowdown is generally associated with a slight rise in the number of claims, the combined ratio – the ratio of total insurance costs plus operating expenses to net premium income – remained close to 100 p.c. in 2009, as it had practically throughout the period 2003-2009. This inverse measure of the profitability of the actual insurance activities, excluding investment income, had exceeded 110 p.c. during the period 2000-2002, but then declined significantly thanks to an increase in premiums, better cost control and more stringent underwriting standards for certain loss-making insurance classes and products.

CHART 36 LONG-TERM INTEREST RATE AND GUARANTEED RATE OF RETURN ON CLASS 21 CONTRACTS



Sources: Thomson Reuters Datastream, CBFA, NBB.
(1) Yield on the secondary market in ten-year Belgian government loans (OLOs).

Statistical annex

List of tables

Tables relating to Belgian credit institutions

Tables relating to Belgian insurance companies

Tables relating to investment services and the securities market

TABLE 1 NUMBER OF CREDIT INSTITUTIONS

	2002	2003	2004	2005	2006	2007	2008	2009
Credit institutions governed by Belgian law with Belgian majority shareholding	36	34	33	26	26	25	23	21
Credit institutions governed by Belgian law with foreign majority shareholding	29	27	26	28	25	27	28	27
EU Member States	21	21	20	23	20	21	21	19
Other States	8	6	6	5	5	6	7	8
Belgian branches of foreign credit institutions	46	48	45	50	54	58	56	56
EU Member States	36	38	36	41	46	49	47	47
Other States	10	10	9	9	8	9	9	9
Total	**111**	**109**	**104**	**104**	**105**	**110**	**107**	**104**

Source: CBFA.

TABLE 2 KEY FIGURES

(data on a consolidated basis)

	2001	2002	2003	2004	2005	2006[1]	2007[1]	2008[1]	2009[1]
A. Large banking groups									
Balance sheet total (billion euro)	940.7	907.5	913.2	1,010.7	1,229.2	1,348.0	1,488.8	1,326.8	1,092.0
Customers' holdings (billion euro)	477.0	465.4	453.9	482.1	532.0	667.4	700.9	612.8	622.5
Loans and advances to customers (billion euro)	374.8	381.2	384.9	433.2	535.1	553.8	619.0	505.0	481.7
Risk asset ratio (p.c.)	12.7	12.8	12.4	12.6	11.1	11.2	10.8	16.2	17.0
Net after tax results (billion euro)	3.4	2.9	3.6	4.6	5.7	9.2	6.2	–20.9	–1.5
Return on average assets (p.c.)	0.4	0.4	0.4	0.5	0.5	0.7	0.4	–1.4	–0.1
Return on average equity (p.c.)	15.0	12.6	14.2	17.3	19.9	23.1	13.7	–40.8	–3.8
Cost-income ratio (p.c.)	72.9	73.2	72.8	70.6	72.3	55.5	60.6	86.3	77.7
B. Total of Belgian credit institutions									
Balance sheet total (billion euro)	1,063.7	1,024.6	1,033.0	1,143.2	1,369.3	1,422.0	1,578.4	1,422.1	1,190.5
Customers' holdings (billion euro)	545.0	535.3	531.9	570.1	622.1	715.7	761.6	681.8	691.9
Loans and advances to customers (billion euro)	416.3	421.3	428.8	482.9	591.3	591.0	666.2	555.6	536.5
Risk asset ratio (p.c.)[2]	12.9	13.1	12.8	13.0	11.5	11.9	11.2	16.2	17.3
Net after tax results (billion euro)	3.8	3.2	4.0	5.2	6.6	9.7	6.7	–20.6	–1.2
Return on average assets (p.c.)	0.4	0.4	0.4	0.5	0.5	0.7	0.4	–1.3	–0.1
Return on average equity (p.c.)[2]	13.7	11.8	13.6	15.8	18.5	22.4	13.2	–36.5	–2.6
Cost-income ratio (p.c.)	74.1	74.7	73.9	72.0	72.6	55.7	61.1	86.1	77.7

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)

	2008	2009
Assets		
Financial assets held for trading	281.4	164.6
Financial assets designated at fair value through profit and loss	28.4	29.7
Available-for-sale financial assets	214.7	176.8
Loans and receivables (including finance leases)	772.3	718.3
Held-to-maturity investments	13.1	12.8
Derivatives used for hedging	4.4	4.6
Tangible assets	8.4	8.2
Goodwill and other intangible assets	4.7	4.1
Investments in associates, subsidiaries and joint ventures	1.6	2.5
Miscellaneous	93.2	69.0
Liabilities		
Financial liabilities held for trading	240.1	147.6
Financial liabilities designated at fair value through profit and loss	60.9	47.1
Financial liabilities measured at amortised cost	955.1	863.1
Financial liabilities associated to transferred assets	7.4	8.0
Derivatives used for hedging	10.1	11.1
Provisions	3.1	2.9
Miscellaneous	96.3	57.0
Total equity and minority interest	49.1	53.7
Balance sheet total	**1,422.1**	**1,190.5**

Source: CBFA.

TABLE 4 MAIN BALANCE SHEET ITEMS BY PRODUCT

(data on a consolidated basis, billion euro)

	2008	2009
Assets		
Loans to credit institutions	213.2	156.1
Loans and advances to other than credit institutions	555.6	536.5
Debt instruments	298.8	264.7
Equity instruments	15.9	8.8
Derivatives[1]	223.1	135.1
Other assets	115.6	89.3
Liabilities		
Debts to credit institutions	276.2	167.6
Customers' holdings	681.8	691.9
Deposits	557.4	541.8
Bank bonds and other debt securities	124.4	150.0
Derivatives[1] and short positions	247.6	157.0
Subordinated liabilities	37.0	30.2
Other liabilities	130.4	90.2
Total equity and minority interest	49.1	53.7
Balance sheet total	**1,422.1**	**1,190.5**

Source: CBFA.

(1) Including accrued income and expenses.

TABLE 5 LOANS AND ADVANCES TO CUSTOMERS[1]

(data on a consolidated basis, billion euro)

	2008	2009
Term loans	265.7	235.8
Mortgage loans	132.2	158.3
Current accounts	24.0	17.9
Consumer credit	16.9	16.9
Finance leases	21.7	19.1
Bills & own acceptances	1.7	0.8
Securitised loans (for capital and not accounting purposes)	19.1	30.1
Other	62.7	44.2
Total	**544.0**	**523.4**

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)

	2008	2009
Total long positions	**316.2**	**276.0**
Debt instruments	**298.8**	**264.7**
Held for trading	37.0	25.7
Designated at fair value through profit and loss	15.8	14.9
Available-for-sale	208.5	170.5
Loans & receivables	24.6	41.1
Held-to-maturity	12.8	12.5
p.m. Debt instruments involved in repo transactions excluding re-used debt instruments	*109.0*	*99.7*
Equity instruments	**15.9**	**8.8**
Quoted equity	9.4	4.8
Held for trading	7.3	2.2
Designated at fair value through profit and loss	0.2	0.9
Available-for-sale	1.9	1.7
Unquoted equity	6.5	4.0
Held for trading	4.3	1.7
Designated at fair value through profit and loss	0.8	0.1
Available-for-sale	1.3	2.2
p.m. Equity involved in repo transactions excluding re-used equity	*5.6*	*0.0*
Investments in associates, subsidiaries and joint ventures (non-consolidated entities)	**1.6**	**2.5**
Total short positions	**14.9**	**9.2**
Debt instruments	**14.3**	**8.6**
Equity instruments	**0.6**	**0.6**

Source: CBFA.

TABLE 7 LIABILITIES TOWARDS CUSTOMERS

(data on a consolidated basis, billion euro)

	2008	2009
Retail deposits	259.1	283.3
of which:		
Sight deposits[1]	52.8	62.6
Savings deposits[1]	129.2	163.5
Term deposits[1]	60.0	32.8
Customer savings certificates	29.9	38.9
Deposits of corporates	256.8	202.3
Deposits of non-credit institutions	34.9	33.1
Other customer deposits	6.6	23.2
Certificates of deposits	37.7	53.6
Bonds and other debt certificates	56.8	57.5
Total	**681.8**	**691.9**

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	
	2008	2009
Derivatives (notional amounts)		
Held for trading	10,913.0	8,573.2
Interest rate derivatives	9,198.5	7,332.3
Equity derivatives	214.8	151.9
Currency derivatives	1,085.4	737.9
Credit derivatives	311.5	300.3
Commodity derivatives	101.0	50.1
Other derivatives	1.8	0.6
Hedging derivatives	347.9	350.7
Micro-hedging	123.8	91.6
Portfolio-hedging	224.2	259.2
Total derivatives	**11,261.0**	**8,923.9**
Off-balance-sheet commitments		
Given		
Loan commitments	315.8	268
Guarantees	281	215.2
Other commitments	365.3	281.8
Received		
Loan commitments	33.9	31
Guarantees	581.5	564.5
Other commitments	229.2	213.1

Source: CBFA.

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

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

	2003	2004	2005	2006	2007	2008	2009
Own funds sensu stricto ("tier 1 capital")[1]	34.3	37.9	39.2	45.9	67.5	55.7	53.9
of which hybrid instruments	2.4	3.1	3.6	0.0	7.8	7.8	6.8
Additional items of own funds for credit and market risks ("tier 2 capital")	18.4	17.5	17.9	19.7	22.6	24.6	17.3
of which upper tier 2[2]	5.4	5.0	4.6	5.8	5.9	9.3	3.4
of which lower tier 2[3]	12.9	12.5	13.3	13.9	16.7	16.6	15.8
Deduction of participations	–3.9	–4.2	–4.8	–3.3	–26.6	–1.0	–1.0
Total	*48.8*	*51.2*	*52.3*	*62.3*	*63.6*	*79.5*	*70.3*
Additional items of own funds for market risks only ("tier 3 capital")[4]	2.1	2.1	1.3	0.1	0.0	0.1	0.2
Risk asset ratio (p.c.)	**12.8**	**13.0**	**11.5**	**11.9**	**11.2**	**16.2**	**17.3**

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)

	2008	2009
Interest income	233.0	143.1
Interest expenses (–)	218.5	128.2
Net interest income	14.5	14.9
Dividend income	0.4	0.2
Net fee income	6.8	5.7
Fees received	*9.5*	*7.8*
Fees paid (excluding the commissions paid to bank agents) (–)	*2.7*	*2.1*
Realised capital gains or losses (on financial assets and liabilities other than measured at fair value through profit and loss)	–0.3	0.2
Trading income (gains or losses on financial assets held for trading)	–6.6	–2.6
Other fair value accounting gains and losses	3.0	–0.3
Gains and losses on financial assets and liabilities designated at fair value through profit and loss	*2.4*	*–0.2*
Fair value adjustments in hedge accounting	*0.6*	*–0.1*
Other net operating income	1.5	0.8
Non-interest income	4.8	3.9
Gross operating income (banking product)	19.3	18.8
Staff expenses (–)	8.6	7.3
Commissions paid to bank agents (–)	0.6	0.6
General and administrative expenses (–)	6.4	5.8
Depreciation (–)	1.0	0.9
Operating expenses (excluding impairment losses and provisions) (–)	16.6	14.6
Impairment losses on financial assets (–)	10.3	5.3
Impairment on property, investment properties, intangible assets, investments and associates and joint ventures accounted for using the equity method (–)	2.3	1.5
Provisions (–)	0.7	0.6
Impairment losses and provisions (–)	13.3	7.4
Share of the profit or loss of associates, and joint ventures accounted for using the equity method	–0.1	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	–0.7	0.0
Net operating income	**–11.4**	**–3.0**
Total profit or loss after tax from discontinued operations	–9.0	0.0
Total profit or loss before tax and minority interest	**–20.5**	**–3.0**
Tax expenses related to profit or loss from continuing operations (–)	0.5	–1.8
Total profit or loss after tax and before minority interest	**–21.0**	**–1.3**
Minority interest (–)	0.3	–0.1
Net profit or loss	**–21.2**	**–1.2**

Source: CBFA.

TABLE 11 NUMBER OF INSURANCE COMPANIES

	2003	2004	2005	2006	2007	2008	2009
A. By the location of their registered office							
Belgium[1]	118	118	110	107	106	100	96
European Economic Area[2]	66	60	58	54	50	51	49
Rest of the world[3]	5	3	3	0	0	0	0
Total	**189**	**181**	**171**	**161**	**156**	**151**	**145**
Free service provision[4]	670	681	740	762	791	873	939
B. By specialisation[5]							
Life insurance	31	31	30	29	30	30	29
Non-life insurance	127	122	116	109	103	99	93
Life and non-life insurance	31	28	25	23	23	22	23
Total	**189**	**181**	**171**	**161**	**156**	**151**	**145**

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)

	2003	2004	2005	2006	2007	2008
Investments	125.2	143.3	166.5	183.7	201.7	202.7
All activities with the exception of class 23	107.9	124.4	141.7	158.3	177.2	184.6
Shares[2]	13.8	15.1	17.9	18.8	19.7	13.4
Debt securities	72.2	88.2	101.2	115.2	130.0	136.6
Land and buildings	2.4	2.6	2.6	2.5	2.6	3.1
Mortgage loans	5.7	5.7	5.5	5.5	5.4	5.4
Investments in affiliated undertakings	8.0	8.2	9.2	11.0	14.2	15.7
Others	5.8	4.6	5.3	5.2	5.3	10.4
Class 23	17.3	18.9	24.8	25.5	24.6	18.1
Shares[2]	13.4	13.7	19.5	21.2	19.5	13.6
Debt securities	2.6	3.2	4.1	3.8	4.6	4.2
Others	1.3	2.0	1.3	0.4	0.5	0.3
Reinsured part of technical provisions	6.2	6.6	5.2	4.9	4.8	7.0
Claims and other assets	11.0	13.8	13.3	13.2	13.8	14.1
Total	**142.4**	**163.7**	**185.0**	**201.9**	**220.4**	**223.8**

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)

	2003	2004	2005	2006	2007	2008
Own funds	8.8	9.4	10.2	10.7	11.9	14.2
Technical provisions	120.8	137.8	156.5	169.9	185.5	188.0
Life insurance (with the exception of class 23)	76.2	88.9	103.7	115.2	130.6	139.4
Class 23	17.5	19.2	25.0	25.7	24.7	18.2
Non-life insurance	23.1	24.2	22.7	23.3	24.0	24.8
Others	5.0	5.5	5.1	5.7	6.2	5.5
Reinsurance companies' deposits	2.4	2.5	2.7	2.6	2.7	4.8
Creditors' claims	8.2	11.8	13.5	16.5	17.6	14.5
Other liabilities	2.2	2.2	2.0	2.2	2.6	2.3
Total	**142.4**	**163.7**	**185.0**	**201.9**	**220.4**	**223.8**

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)

	2003	2004	2005	2006	2007	2008
A. Technical account in life insurance						
Net premiums written	17.7	20.0	25.2	20.4	21.9	19.5
Claims paid (–)	7.9	8.5	10.2	13.0	13.0	15.3
Change in the provisions for claims (–)	12.9	15.2	20.5	12.4	13.3	2.9
Premiums after insurance costs	**–3.1**	**–3.7**	**–5.4**	**–5.0**	**–4.4**	**1.3**
Net operating expenses (–)	1.2	1.2	1.3	1.4	1.6	1.6
Result before investment income	**–4.3**	**–4.9**	**–6.8**	**–6.4**	**–6.0**	**–0.3**
Net investment income	4.8	5.7	8.0	7.4	6.9	–3.4
Technical result life insurance	**0.5**	**0.8**	**1.2**	**1.0**	**1.0**	**–3.7**
B. Technical account in non-life insurance						
Net premiums written	9.1	9.6	8.9	9.3	9.3	9.7
Claims paid (–)	5.7	5.7	5.6	5.9	6.3	6.5
Change in the provisions for claims (–)	0.8	1.0	1.1	0.8	0.5	0.4
Premiums after insurance costs	**2.6**	**2.9**	**2.3**	**2.6**	**2.5**	**2.8**
Net operating expenses (–)	2.8	2.9	2.7	2.8	2.7	2.8
Result before investment income	**–0.2**	**0.0**	**–0.4**	**–0.2**	**–0.2**	**0.0**
Net investment income	1.0	1.2	1.5	1.3	1.5	0.2
Technical result non-life insurance	**0.8**	**1.2**	**1.1**	**1.2**	**1.3**	**0.2**
C. Non-technical account						
Total technical result life and non-life insurance	1.3	2.0	2.3	2.2	2.2	–3.5
Residual net investment income	–0.2	0.3	0.7	0.5	1.7	0.3
Other and exceptional results and taxes	–0.4	–0.6	–0.6	–0.5	–0.1	–0.7
Net result	**0.6**	**1.7**	**2.4**	**2.2**	**3.8**	**–3.9**
p.m. Return on equity (p.c.)	*7.3*	*18.0*	*23.3*	*20.8*	*31.7*	*–27.3*

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)

	2003	2004	2005	2006	2007	2008
Explicit margin	9,467	10,706	11,726	12,767	14,199	16,834
Percentages of required margin	*179*	*181*	*180*	*179*	*183*	*206*
Implicit margin	3,634	4,092	5,148	5,279	3,144	1,407
Future profits of life insurance activities	1,874	755	749	655	484	360
Unrealised capital gains	1,761	3,337	4,399	4,624	2,660	1,047
Percentages of required margin	*69*	*70*	*79*	*74*	*40*	*17*
Total margin	**13,101**	**14,799**	**16,874**	**18,046**	**17,344**	**18,241**
Percentages of required margin	***248***	***251***	***259***	***253***	***223***	***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)

	2003	2004	2005	2006	2007	2008	2009
Bonds	52.7	55.8	57.4	59.5	64.1	66.2	69.0
Equities	12.9	12.7	13.9	14.1	10.1	7.7	6.6
Real estate	2.8	2.4	2.2	2.1	1.4	1.6	1.7
Loans	4.7	3.6	2.7	2.3	2.3	2.8	2.6
UCITS	15.6	15.1	16.2	16.5	16.1	12.5	12.1
Others	11.3	10.3	7.6	5.5	5.9	9.2	8.0
Total (billion euro)	**127.6**	**147.3**	**168.8**	**182.7**	**193.1**	**196.5**	**210.8**

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)

	2003	2004	2005	2006	2007	2008	2009
Number of companies	37	36	31	27	26	23	23
Securities portfolio for own account (billion euro)[1][2]	18.60	1.89	0.25	0.14	0.23	0.39	0.39
Balance sheet total (billion euro)[2]	15.48	3.11	2.37	2.30	3.06	2.70	2.28
Securities in trust (billion euro)	32.8	28.4	41.1	46.6	73.2	54.8	69.6
Regulatory own funds (billion euro)	0.23	0.26	0.29	0.22	0.43	0.73	0.74
Risk asset ratio (p.c.)	16.2	36.0	58.2	46.5	35.9	39.1	44.3
Income (billion euro)[2]	0.31	0.19	0.27	0.32	0.36	0.28	0.29
Operating expenses (billion euro)[2]	0.32	0.18	0.18	0.21	0.25	0.28	0.30
Net after tax results (billion euro)[2]	0.02	0.05	0.10	0.13	0.17	0.06	0.06
Return on average equity (p.c.)[3]	2.7	11.9	28.0	36.5	37.8	8.0	7.8

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)

	2003	2004	2005	2006	2007	2008	2009
Number of companies	30	30	23	22	23	26	24
of which with a majority of institutional shareholders	15	14	8	8	9	10	9
Assets under management (billion euro)	183.3	191.7	32.4	46.7	49.1	24.5	49.4
Balance sheet total (billion euro)	1.08	1.21	0.08	0.10	0.09	0.08	0.08
Own funds (billion euro)	0.65	0.70	0.05	0.05	0.05	0.06	0.06
Income (billion euro)	0.77	0.88	0.07	0.08	0.10	0.05	0.05
Operating expenses (billion euro)	0.48	0.54	0.04	0.05	0.06	0.05	0.05
Net after tax results (billion euro)	0.21	0.26	0.02	0.03	0.03	0.00	0.01
Return on average equity (p.c.)	32.9	37.8	39.0	54.1	62.5	3.2	10.5

Source: CBFA.

TABLE 19 KEY FIGURES OF MANAGEMENT COMPANIES OF UNDERTAKINGS FOR COLLECTIVE INVESTMENT

(data on a company basis)

	2003	2004	2005	2006	2007	2008	2009
Number of companies	–	–	5	6	7	7	7
Assets under management (billion euro)	–	–	211.4	256.4	251.9	192.5	189.1
Balance sheet total (billion euro)	–	–	1.4	0.9	1.0	1.0	0.7
Own funds (billion euro)	–	–	0.7	0.3	0.3	0.4	0.4
Income (billion euro)	–	–	0.9	1.2	1.5	1.2	0.9
Operating expenses (billion euro)	–	–	0.6	0.9	1.1	1.1	0.9
Net after tax results (billion euro)	–	–	0.3	0.3	0.3	0.3	0.2
Return on average equity (p.c.)	–	–	40.6	87.9	78.3	73.5	47.4

Source: CBFA.

TABLE 20 BELGIAN UNDERTAKINGS FOR COLLECTIVE INVESTMENT

	2003	2004	2005	2006	2007	2008	2009
A. Number per legal form (end of period)							
Investment companies	105	108	108	108	105	98	95
Number of compartments	1,252[5]	1,365	1,477	1,649	1,842	1,900	1,931
Investment funds	16	18	17	40	37	37	37
Pension-savings funds[1]	11	12	12	14	14	14	14
Real estate UCITS[2]	11	11	12	14	15	15	15
Undertakings for investment in receivables[3]	10	9	7	7	6	5	5
Venture capital UCITS[4]	2	2	2	2	2	2	1
Total	**155**	**160**	**158**	**185**	**179**	**171**	**167**
B. Assets (billion euro)							
1. Net asset value end of preceding year	78.26	85.05	95.34	112.14	124.27	121.22	87.61
2. Subscriptions	20.32	23.15	37.60	39.99	55.51	38.87	34.90
3. Redemptions	16.86	17.58	22.26	29.58	48.54	46.91	35.96
4. Net amounts invested (4 = 2 – 3)	**3.47**	**5.57**	**15.34**	**10.41**	**6.97**	**–8.05**	**–1.06**
5. Costs	0.99	1.14	1.18	1.41	1.39	1.24	1.09
6. Capital gains or losses	4.31	5.86	2.64	3.12	–8.63	–24.33	6.81
7. Net asset value end of period (7 = 1 + 4 – 5 + 6)	**85.05**	**95.34**	**112.14**	**124.27**	**121.22**	**87.61**	**92.26**

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)

	2003	2004	2005	2006	2007	2008	2009
Per legal form							
Investment companies	197	184	170	173	171	191	191
Number of compartments	2,067	2,030	2,122	2,172	2,366	2,632	2,517
Investment funds	70	61	46	53	60	70	85
Total	**267**	**245**	**216**	**226**	**231**	**261**	**276**
Per category							
Undertakings with UCITS-passport	218	206	198	209	216	250	266
Number of compartments	1,925	1,918	2,023	2,068	2,258	2,530	2,412
Undertakings without UCITS-passport	49	39	18	17	15	11	10
Number of compartments	142	112	99	104	108	102	105
Total	**267**	**245**	**216**	**226**	**231**	**261**	**276**

Source: CBFA.

TABLE 22 BREAKDOWN OF UNDERTAKINGS FOR COLLECTIVE INVESTMENT DISTRIBUTED IN BELGIUM ACCORDING TO INVESTMENT STRATEGY

(billion euro)

	2003	2004	2005	2006	2007	2008	2009
Bond funds	31.73	35.33	52.92	56.18	45.85	29.42	32.01
Medium-term funds	1.89	1.83	1.47	0.95	0.78	0.59	0.67
Money market funds	5.71	6.16	5.92	5.30	7.01	7.83	2.04
Equity funds	26.72	27.86	39.71	43.40	42.42	18.60	28.89
Funds with capital protection	35.90	41.40	41.70	42.62	42.01	36.15	29.39
Balanced funds	22.85	23.42	25.57	29.85	31.98	21.49	25.02
Pension-savings funds	7.42	8.69	10.32	11.44	11.78	8.98	11.12
Real estate funds	3.85	4.42	5.59	7.27	6.12	4.67	5.79
Private equity funds	0.08	0.09	0.14	0.15	0.12	0.05	0.05
Miscellaneous	0.02	0.10	0.47	0.80	0.34	0.16	0.18
Total	**136.17**	**149.28**	**183.81**	**197.96**	**188.42**	**127.95**	**135.16**

Source: BEAMA.

TABLE 23 GROSS PUBLIC ISSUES OF SECURITIES IN BELGIUM

(billion euro)

	2003	2004	2005	2006	2007	2008	2009
1. Shares							
Belgian companies	0.35	3.56	1.83	1.33	17.69	6.51	0.58
Foreign companies	0.03	0.09	0.02	0.00	0.00	0.00	0.00
Total	*0.38*	*3.65*	*1.84*	*1.33*	*17.69*	*6.51*	*0.58*
2. Fixed income securities							
2.1 Bonds	*1.23*	*5.52*	*4.97*	*5.54*	*5.29*	*12.28*	*10.87*
Belgian companies	0.05	0.23	0.38	0.24	0.21	3.10	5.61
Foreign companies	1.18	5.29	4.59	5.31	5.08	9.18	5.26
2.2 Fixed income securities with capital at risk(1)	*0.34*	*0.27*	*0.55*	*1.11*	*0.77*	*0.65*	*0.22*
Belgian companies	0.00	0.00	0.00	0.02	0.00	0.00	0.01
Foreign companies	0.34	0.27	0.55	1.09	0.77	0.65	0.21
2.3 Total	*1.57*	*5.78*	*5.52*	*6.65*	*6.06*	*12.93*	*11.09*
3. Subordinated debt issued by credit institutions	**0.66**	**0.96**	**1.05**	**1.44**	**1.54**	**0.48**	**0.89**

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.

Oversight of financial infrastructure

Overview of the NBB's oversight activities for 2009

Introduction

A central bank's policy objective for overseeing payment and settlement infrastructures is to promote the global safety and efficiency of the financial system. Consequently, oversight activity encompasses all components of these infrastructures which are relevant for the global resilience of the sytem.

The NBB's oversight covers 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, extending to message providers and payment card operators.

Many of these infrastructures have an international dimension, some of them limit operations to the euro area, others operate worldwide. As laid down in the so-called Lamfalussy principles for cooperative oversight, the NBB performs the role of lead overseer for international infrastructures that are established in Belgium (such as SWIFT and Euroclear). As a corollary, and under the leadership of the relevant national central bank, the NBB plays a role in cooperative oversight for international infrastructures established outside Belgium, but providing services to Belgium. As can be seen from table 1, the NBB is involved in a number of cooperative oversight arrangements.

On the domestic front, the National Bank of Belgium is in charge of overseeing securities clearing and settlement systems, while the CBFA is responsible for prudential supervision of the entities operating these systems. Securities clearing and settlement infrastructures are required to have the status of a credit institution (such as Euroclear Bank) or, in compliance with the Belgian legal framework, of a settlement institution (such as Euroclear Belgium) or of an assimilated institution (such as the holding company Euroclear SA/NV).

This supervisory structure will be modified in the coming months as Belgium has opted for the "twin peaks" system. In addition to its present responsibility for the stability of the system as a whole, the National Bank of Belgium will take charge of supervising individual financial intermediaries, while a separate entity will be responsible for preserving market integrity and for consumer protection. Under this new framework, from next year onwards, the NBB will be in charge of both the oversight of clearing and settlement infrastructures and the supervision of institutions operating them.

1. Oversight of securities settlement systems

The NBB exercises its oversight responsibilities regarding securities settlement systems (SSS) vis-à-vis four operators providing settlement services in Belgium, namely the Euroclear companies (Euroclear SA, Euroclear Bank and Euroclear Belgium) and the NBB itself.

Euroclear SA/NV (ESA) is the Belgium-based parent company of the Euroclear group which comprises the international central securities depository Euroclear Bank as well as national CSDs Euroclear Belgium, Euroclear France, Euroclear Netherlands, Euroclear UK & Ireland, Euroclear Sweden and Euroclear Finland. It owns the securities processing platforms of these various entities that are currently under consolidation and provides various common

TABLE 1 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				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		

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 following 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 delivered by ESA to the CSDs of the group. Besides their national responsibilities towards Euroclear Bank and Euroclear Belgium, the Belgian authorities are also in charge of coordinating this multilateral cooperation process[1].

1.1 Oversight of ESA

At the end of 2008, Euroclear acquired NCSD, which owned the CSDs of Sweden and Finland. Consequently, the Swedish and Finnish central banks and securities market regulators joined the ESA cooperative arrangement and an updated version of the related Memorandum of Understanding[2] was signed. The integration of the

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

(2) Memorandum of understanding of 5 October 2009 on the cooperation framework for the oversight/supervision of Euroclear SA/NV (ESA) related to the supervision/oversight of the ESA services provided to the Euroclear Group SSSs.

Swedish and Finnish CSDs into the Euroclear group and plans for the future migration of their systems onto the Euroclear platform by mid 2012 will be a further point of attention for the group of regulators.

The ongoing monitoring of strategic programmes is one of the recurrent topics addressed by the group of ESA regulators in the framework of their cooperation. Such monitoring is based on regular reporting from ESA, the main objective being for the regulators (a) to strive for continuous compliance of the new common settlement infrastructure with the applicable standards and (b) to ensure that the implementation of the strategic programmes will threaten neither business continuity nor the robustness of CSDs' operational reliability. Due to delays in the development of the next phase of the projects relating to the delivery of custody services, there has been no major launch during the course of this year. The initial consolidation plans have also been reviewed in order to better take into account the new challenges posed by the future implementation of TARGET2 Securities.

Considering the partial reliance of Euroclear on external parties for the development of its new settlement and custody platform, the authorities also decided to assess these outsourcing arrangements by agreeing, in the first instance, on a specific framework based on the applicable standards and/or recommendations and best practices. A short description of this outsourcing assessment framework, as developed by the NBB, is given in the box below.

Assessment of the common functions delivered by ESA is another important strand of the joint oversight/supervisory work. Since the group risk management arrangements had been singled out for review in 2009, this prompted the authorities to make several recommendations for the review process initiated by the ESA Board, in line with the group's corporate strategy which regards reducing market risk as crucial for an infractructure like Euroclear.

Box 1 – Outsourcing assessment framework

The NBB has developed a framework based on sound practices for outsourcing. This framework is intended to guide NBB oversight when evaluating the governance and management of an outsourcing process. These guidelines are generic and can be used to assess all types of activities and all types of infrastructures covered by oversight.

Outsourcing is defined as the process in which a company ("the outsourcing company") enters into a contract with a service provider for carrying out activities that could be undertaken by the company itself. Buying goods or standardised services where no transfer of information or knowledge from the company to the third party is required, is not considered as outsourcing.

The main principle is that the outsourcing company must:
- remain in control of its business risks;
- continue to meet regulatory requirements; and
- be able to demonstrate the above to regulators.

The framework is built around the eight steps in the outsourcing process.

1. **Board takes responsibility**. The Board of Directors and senior management retain accountability for any outsourced activity. They define the outsourcing strategy and set up outsourcing policies and a management structure.

2. **Management assesses the risks related to outsourcing an activity**. These risks can be categorised into strategic risk, country risk (in case of off-shoring), concentration risk, reputational risk, counterparty risk, operational risk, compliance and regulatory risk, contractual and legal risk and exit strategy risk.

3. **Management documents risk-based requirements.** Before selecting a service provider, management needs to document the requirements that the service provider needs to meet in the following areas: scope of services, minimum acceptable characteristics (e.g. experience, technology, financial position), contractual and legal arrangements, internal control environment, business continuity, service levels and their monitoring, compliance and regulatory arrangements.

4. **Management performs due diligence when selecting the provider(s)**. Management should assess whether the service provider's response to the Request For Proposal (RFP) meets the above-mentioned risk-based requirements. Any deviation should be investigated and documented. Intangibles such as business culture and strategies should be taken into account as well.

5. **Management concludes a comprehensive, legally binding contract**. The most frequent cause of unsuccessful outsourcing is that the service provider does not meet the company's expectations, usually because these expectations were poorly understood or articulated by both parties. Therefore, the outsourcing company needs to have a legally binding contract that deals with:
   - contractual and legal arrangements: scope of the service, duration, roles and responsibilities, subcontracting, pricing, renegotiation and termination rights, choice of law;
   - transitional arrangements;
   - operational arrangements: Service Level Agreements (SLA) with Key Performance Indicators (KPI), internal control measures and external auditing, business continuity measures and monitoring;
   - compliance and regulatory arrangements.

   Management ensures contingency plans are in place. Outsourcing creates dependence on a third party. Coordination of contingency plans at both companies is necessary. The outsourcing company should be prepared for problems at the service provider, such as service degradation, business disruptions, non-performance or even bankruptcy.

6. **Management implements the contract**. In order to avoid any interruption of service, management should manage transition, human resources and train staff.

7. **Management monitors the service delivered until the contract expires**. During the course of the contract, management should monitor the service levels, financial viability, internal control environment and business continuity measures. It should also assess the impact of changes in regulations or the economic environment, for instance. Management should also regularly evaluate alternative service providers and renegotiate or renew the contract if needed.

At each step, control measures should be implemented and internal audit should be involved. The outsourcing activities should be an integral part of Internal Audit's surveillance through two types of mission:
- audit on the governance process of outsourcing, and
- audit on the adequacy of the control environment of an outsourced activity (i.e. review the contract, SLA, internal controls, etc.).

Overseers should take into account outsourcing activities as an integral part of their assessments by considering the adequacy of the governance and management processes and/or by evaluating the effectiveness of an existing outsourcing arrangement, used as a test case. Overseers can build on the work of the regulated company's Internal Audit, independent reviews of the service provider or the service provider's home regulator, if applicable.

Overseers should also be aware of the potential concentration risk when multiple companies use a limited number of service providers. Adequate contingency plans should therefore be in place.

1.2 Oversight of Euroclear Bank

Euroclear Bank is the international central securities depository (ICSD) operating the Euroclear Bank SSS, providing settlement and custody services for international bonds, equities, derivatives and fund instruments to customers in around 80 countries.

Euroclear Bank's settlement activities rely in particular on a network of over forty links that have been established with other SSSs worldwide. The Euroclear risk assessment review of its links has been adapted to bring it into line with the recommendations made by the NBB in its Risk Analysis framework [1]. Specific attention has been paid by the NBB to the functioning of the link between Euroclear Bank and Clearstream Banking Luxembourg (the so-called "Bridge"), whose specificity is to induce credit allocation between both ICSDs in support of settlement activity. In accordance with the obligation made to the CSDs to fully secure this credit activity, the ICSDs have implemented a comprehensive set of risk mitigation measures allowing the full securisation of their bilateral positions. These measures have been endorsed by the authorities of both countries which will further monitor their effective implementation. The systemic relevance of this link will also lead these authorities to further cooperate in other domains, including on business resiliency issues.

The Euroclear Bank's liquidity management has been another topic of specific interest for the NBB during the exercise under review. The main focus was set on the contingency situations and the adequacy of the liquidity sources Euroclear could rely on to withstand extreme but plausible stress scenarios, going behind the failure to pay of the participant with the largest debit position (as requested under the current oversight standards). Solutions are currently being examined by Euroclear with a view to taking greater advantage of the strict collateralisation policy it applies and which guarantees Euroclear Bank access to a broad collateral portfolio that could be more structurally used, especially in the event of a liquidity strain. Euroclear also intends to further enhance its stress-testing capabilities in order to better assess the level of liquidity that should be requested under different extreme but plausible scenarios and also to better identify the several operational procedures to be developed and tested, should a liquidity shock occur.

1.3 Oversight of Euroclear Belgium

After the launch of the integrated Euroclear Settlement for Euronext-zone Securities (ESES) platform in January 2009, the ESES CSDs (Euroclear France, Euroclear Netherlands and Euroclear Belgium) subsequently integrated their governance arrangements over the first half of 2009. This adaptation was followed up by the French, Dutch and Belgian supervisors and overseers, which coordinated their information exchange and decision-making process. In the first quarter of 2010, the ESES CSDs announced plans to further integrate their operating arrangements.

With the ESES integration, the authorities involved decided to step up their cooperation through regular meetings to exchange information among themselves and with the ESES management and by coordinating their views prior to taking decisions. This cooperation between the ESES authorities complements the ESA cooperation framework.

The oversight and supervisory activities during the year under review further included an assessment by the three central banks of the ESES SSSs' compliance with the ESCB CESR recommendations for SSSs which will be finalised in the coming months. Other topics of interest included the matching and settlement efficiency on the ESES platform, harmonisation of statistical reporting for oversight purposes across the CSDs and the procedures in the event of an ESES participant defaulting.

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

Box 2 – Working arrangements for the oversight and supervision of the ESES CSDs/SSSs

The securities commissions and central banks of France, the Netherlands and Belgium supervise and oversee respectively the CSD/SSS Euroclear France (EF), Euroclear Netherlands (ENL) and Euroclear Belgium (EBE). They have agreed on enhanced working arrangements for supervising and overseeing the above SSSs/CSDs that together constitute the Euroclear Settlement for the Euronext-zone Securities (ESES) CSDs/SSSs.

The enhanced working arrangements are deemed appropriate as, since January 2009, the ESES CSDs/SSSs have been settling securities transfers on a single IT platform where services, market practices and tariffs are largely harmonised. And since March 2009, the ESES CSDs have streamlined the ESES CSDs' governance so that the membership composition of the board, committees and management structure in each CSD has become identical or strongly overlapping.

Each ESES supervisor/overseer remains solely and fully responsible for the proper execution of its respective competences, tasks and duties under its applicable national regulatory scheme, as regards its own CSD/SSS. However, each ESES supervisor/overseer also endeavours to reach common assessments and resolutions by consensus. To that end, each ESES supervisor/overseer taking a decision that has a significant impact on the functioning of the ESES SSS/CSDs will inform and consult the other ESES supervisors/overseers, prior to such a decision.

The arrangement is without prejudice to the existing ESA MoU[1] regarding the supervision/oversight of the common services that are provided by ESA to all Euroclear group entities, including the ESES CSDs/SSSs. Practically, for the ESES working arrangements, the ESA regulatory high-level and technical-level committees meet in an ESES-only composition, among authorities and with the ESES SSS/CSDs management, to look at ESES-specific topics.

(1) Memorandum of understanding dated 5 October 2009 on the cooperation framework for the oversight/supervision of Euroclear SA/NV (ESA) related to the supervision/oversight of the ESA services provided to the Euroclear Group SSSs.

1.4 Oversight of NBB-SSS

The NBB-SSS's first full year (2009) of operation under the new cash settlement framework, namely as an ancillary system directly linked to Target 2 (T2)[1], went off smoothly.

The preparatory work for the development phase of the TARGET2 Securities (T2S) project is carried out by the NBB-SSS operational staff. Progress with this work is also monitored from an oversight perspective in order to ensure that the connection of the NBB-SSS application to the future T2S platform will preserve the NBB-SSS's compliance with the applicable oversight standards.

1.5 Oversight arrangements for TARGET2 Securities (T2S)

The T2S infrastructure, expected to become operational by 2013, will be subject to regulatory and oversight requirements due to its intrinsic criticality. The ECB took the initiative to start preliminary works establishing an oversight arrangement for the T2S system. The NBB took part in the joint meetings that were held for this purpose with the central banks and the securities commissions of countries of prospective participating CSDs.

2. Oversight of payment systems and payment instruments

The oversight of payment systems covers both large-value payment systems (TARGET2) and retail payment systems (CEC). The payment instruments overseen currently comprise card payment schemes, too.

2.1 Oversight of TARGET2 (T2)

As is customary, the NBB contributed to the Eurosystem's oversight of TARGET2 (T2). The results of the comprehensive oversight assessment[2] of T2, which were published in May 2009, concluded that the T2 design fully complies with the whole set of Core Principles. Those positive results also encompass the NBB Proprietary Home Accounting (PHA) module RECOUR. The latter is one of the six domestic PHA applications which are allowed to perform limited real-time gross settlement services during the transition period ending 2012.

The business continuity oversight expectations for Systemically Important Payment Systems had to be implemented by TARGET2 as from June 2009. The assessment

(1) For details about the NBB-SSS settlement process in TARGET2, see the NBB's 2009 Financial Stability Review, p. 98.

(2) Assessment against the Core Principles for Systemically Important Payment Systems (SIPS).

process that was initiated shortly after this deadline is not yet fully completed. Its preliminary results suggest that crisis management and business continuity matters are being adequately and effectively dealt with within the T2 and its PHAs' operation.

2.2 Oversight of the Centre for Exchange and Clearing

In 2009, the NBB carried out its review of the financial risk management of the Centre for Exchange and Clearing (CEC), the Belgian automated interbank retail payment system which processes the vast majority of credit transfers and cheques settled between Belgian banks, as well as their direct debit operations.

The review was decided following the migration of the CEC settlement process to TARGET2 and taking into account the interrelationship with the settlement procedures of the national card payment schemes (CPS) Bancontact-Mister Cash, which was also assessed (see below, under 2.3), and the particular market conditions that prevailed in the second half of that year.

The review of the financial risk management mechanisms and procedures led the overseer in particular to the recommendation that the CEC, which settled the operations exchanged between its participants once a day on a net multilateral basis, should settle its operations more frequently in order to reduce the amounts at stake in case a participant should default. The CEC decided to implement several settlement cycles per day, which is a fundamental change in the system design.

2.3 Oversight of card payment schemes

The Eurosystem recorded substantial progress in its 2009 oversight assessment of domestic card payment schemes (CPS), being defined as CPSs operating exclusively in the euro area[1]. The NBB oversight function was responsible for conducting the assessment of the Belgian CPS Bancontact-Mister Cash.

The assessment activities for international CPSs are still ongoing. They require more extensive cooperation and have to take into account the more complex organisation of those schemes owing to their wider scope. The NBB coordinates the activities of the cooperative assessment group in charge of assessing MasterCard Europe, and takes part in the assessment group devoted to Visa Europe.

In order to ensure a similar application of the oversight standards, the individual assessments of both national and international CPSs will be peer-reviewed during the course of 2010. The main results of this global assessment exercise are envisaged to be published at an aggregate level around the end of 2010.

2.4 Oversight of payment institutions

In December 2009, the EU Directive on Payment Services in the Internal Market[2], better known as the Payment Services Directive (PSD), was transposed into Belgian law. The aim of this legislation is to facilitate cross-border payments within Europe by providing the Single Euro Payments Area (SEPA) with an appropriate legal basis, while also enhancing consumer protection. The PSD creates a new category of payment service providers: the payments institutions (PI). The PSD defines the conditions that have to be fulfilled if a system wants to be recognised as a PI and specifies the activities a PI can carry out.

Licenses are granted to payments institutions by the Banking, Finance and Insurance Commission (CBFA), which is also responsible for the supervision of these institutions. These competences of the CBFA do not impinge on the National Bank's responsibility in the field of payment systems, so a PI running a payment system would also be subject to oversight by the NBB, for that specific activity. Arrangements for the necessary cooperation and exchange of information between the NBB and CBFA are laid down in the law transposing the PSD.

A few service providers, most of which were previously active, have already been granted the status of PI by the CBFA since the transposition of the PSD. They include ATOS Worldline.

3. Oversight of service providers: SWIFT

The NBB acts as lead overseer of the Society for Worldwide Interbank Financial Telecommunication (SWIFT), as the company is incorporated in Belgium. The oversight of SWIFT is performed in cooperation with the G10 central banks[3]. SWIFT is not a payment system but a key messaging provider for payment and securities settlement infrastructures throughout the world. Central bank

(1) A description of the features of this assessment process can be found in the NBB's 2009 Financial Stability Review, pp. 98-99.

(2) Directive 2007/64/EC of the European Parliament and of the Council of 13 November 2007 on payment services in the internal market.

(3) The practical arrangements for the oversight of SWIFT were described in the NBB's 2005 Financial Stability Report, pp. 101-103.

oversight of SWIFT is necessary in view of its crucial importance for the safety and efficiency of payment and securities settlement systems.

In early 2009, SWIFT provided overseers with an updated version of its self-assessment report regarding the High Level Expectations (HLEs), which constitute the framework for reviewing SWIFT activities that fall within the scope of the oversight[1]. SWIFT's demonstration of compliance with the HLEs does not reflect the overseers' opinion, but SWIFT's own assessment of how it lives up to the HLEs.

In the fourth quarter of 2007, SWIFT announced plans to overhaul its messaging infrastructure, which included setting up a multi-zonal messaging architecture. The new topology enables multiple processing zones, making it possible for intra-zone messages to be kept within their region of origin. This major project to move to a distributed architecture was split into two phases. In the first stage, two message processing zones were created, namely the European and Trans-Atlantic zones. Country allocation to processing zones was determined in 2008. An additional SWIFT operating centre for the European zone started up in 2009. SWIFT added a command and control capability in Asia, which allows its operations to be controlled now from either Asia, Europe or the US. In the second stage of the distributed architecture project, SWIFT is to build a new operating centre, replacing one of those currently in use.

One of the major points of interest in the oversight activities in 2009 was 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.

Other areas of specific SWIFT oversight attention include cyber defence, IT audit activities, security risk management and enterprise risk management. The next steps in the roll-out of a renewed distributed architecture infrastructure will also be a major oversight focus in the coming year.

In the context of the global financial turmoil, overseers monitored SWIFT's financial position closely, as well as trends in its messaging volumes. SWIFT's FIN messaging traffic, which is the major contributor to the company's revenue, decreased by 2.6 p.c. in 2009. This reduction in traffic was the first year-on-year decline ever for SWIFT, which had known sustained message volume growth since its inception more than 30 years ago. Traffic volumes started picking up again during the last quarter of 2009. Even if the decline in traffic resulted in lower revenue over 2009, SWIFT was still able to show a profit over the year as a whole because a structural cost reduction programme launched in 2009 (and extending into 2010) enabled it to make considerable cost savings. SWIFT continues to enjoy a strong financial position, with all investment, including the major distributed architecture project, being funded out of operating cash flow.

SWIFT's programme to structurally reduce costs focuses on achieving efficiency gains through business process optimisation. Overseers are monitoring this business process optimisation initiative to make sure that it does not have any adverse impact on systems controls or infrastructure resilience.

(1) The 2007 issue of the FSR presented the High Level Expectations for the Oversight of SWIFT, pp. 95-101.

Box 3 – Oversight of service providers to critical payment and securities settlement infrastructures: guaranteeing a level playing field

In 2009, SWIFT launched a community consultation to generate and exchange ideas in preparation for the company's 2015 strategy. The SWIFT Board will make choices on the 2015 strategy in mid 2010 after further extensive consultations with the user community. Several market trends and technological developments identified by SWIFT have also been recognised by overseers: technology barriers for competitors to start offering services similar to SWIFT's have lowered, the underlying SWIFT network over which the messages are carried is becoming less of a differentiator, and sophisticated security features are increasingly commoditised. At the same time, some critical settlement infrastructures have opted for models whereby they choose several network or messaging services providers rather than a single one.

When the overseeing central banks decided more than a decade ago to expand their oversight of SWIFT, they did so in a coordinated effort, primarily for reasons of efficiency, but also for reasons of consistency, i.e. to make sure that central banks' oversight expectations vis-à-vis SWIFT were communicated consistently. The High Level Expectations for the Oversight of SWIFT provide a common set of expectations for this global messaging company. At the time, the overseeing central banks decided to address their security and resilience expectations *directly* to SWIFT, because the company had been identified as a major messaging services provider in the context of correspondent banking activities and for critical payment and securities settlement infrastructures. In the latter case, as these critical infrastructures are themselves subject to oversight, request for information on the critical services provided by SWIFT are not obtained indirectly through the infrastructures, but directly from SWIFT itself. Oversight expectations centre around security (confidentiality, integrity, availability) and system resilience.

The fact that SWIFT is subject to the overseers' High Level Expectations might lead it to make investments in security and resilience that would not have been envisaged by a non-overseen company operating in a competitive environment. When selecting a messaging services provider, it should be ensured that a critical market infrastructure takes into account the proper resilience requirements.

Overseers are reflecting on how they can best guarantee a permanent level playing field amongst messaging services providers, so that financial infrastructure does not solely select providers on the basis of cost, but also on the basis of resilience. The level playing field could be fostered by extending the applicability of standards like the High Level Expectations for SWIFT to any messaging services provider that is planning to offer services to a critical payment or securities settlement infrastructure. By simply responding to a request for proposal from an infrastructure, any such provider would then know that, by offering its services, it would become subject to specific security and resilience requirements from overseers. As it is currently the case for SWIFT, the implementation of these requirements could be reviewed by overseers, either indirectly through the oversight of the critical infrastructure using the service provider or directly through the oversight of the provider itself.

Liquidity risk management: the perspective of overseers of financial market infrastructures

As a consequence of the financial crisis which created huge liquidity shortages in the banking sector and led central banks to inject vast amounts of liquidity, liquidity risk has become a top priority on the regulators' agenda. The Basel Committee on Banking Supervision (BCBS), in particular, issued the "Principles for the management and supervision of liquidity risk" in September 2008, and the "International framework for liquidity risk measurement, standards and monitoring" (a consultative document) in December 2009.

1. FMIs and the financial crisis

Financial Market Infrastructures (FMIs) are set up to transfer assets, in the case of Real Time Gross Settlement (RTGS) Systems and Securities Settlement Systems (SSS), or to net assets and transfer the balances, in the case of Central Counterparties (CCPs). For these infrastructures, the financial crisis meant a real life stress test of their financial resilience and their ability to cope with extreme market circumstances. The crisis has confirmed that the smooth functioning of FMIs requires, beside adequate organisation, operational design and tools, sound liquidity management not only by FMIs themselves but also by their participants, as otherwise the system would suffer gridlock. In particular, FMIs should be set up and should function in such a way that problems at one participant do not spread to other participants and do not create a domino effect through the FMI, affecting its other participants.

During the crisis, many banks faced liquidity shortages, and, in particular, many FMI participants were affected by such problems. Some FMIs experienced bankruptcy of a participant (the most notable example was the Lehman failure), yet the FMIs did not experience serious liquidity problems themselves. That is partly because liquidity risk for banks is different from liquidity risk for FMIs; the nature of the financial crisis was also a factor.

Liquidity risk in FMIs differs from the liquidity risk facing banks. This can best be illustrated by the different definitions used by the relevant supervisory authorities. The BCBS defines liquidity risk as the ability of a bank to fund increases in assets and to meet obligations as they come due, without incurring unacceptable losses.[1] The focus of the CPSS-IOSCO is somewhat different, defining liquidity risk as the risk that a counterparty will not settle an obligation for full value when due, but on some unspecified date thereafter.[2] The reason for this difference in scope lies in the fact that banks and FMIs, even if the latter have the status of a (limited purpose) bank, have fundamentally different activities and, as a consequence, have a different profile with respect to liquidity risk. In their asset and liabilities management, banks engage in maturity mismatch and usually fund longer term assets with shorter term liabilities: that is the basic constraint for their liquidity risk management. As a rule, FMIs do not engage in any maturity transformation, and do not invest in longer term assets. *Under normal circumstances*, FMIs focus their liquidity risk management on a smooth operational throughput of transactions in the FMI by avoiding liquidity gridlock, using techniques and procedures

(1) Basel Committee on Banking Supervision, Principles for sound liquidity management and supervision, September 2008.
(2) CPSS-IOSCO, Recommendations for Securities Settlement Systems, November 2001.

such as queuing arrangements, prioritization algorithms, netting arrangements (e.g. in hybrid systems), intraday credit arrangements, and securities lending arrangements. *Under crisis circumstances*, the FMIs are typically required in their liquidity risk management to be able to withstand stress events such as the failure of the participant with the highest net debit position in the system. This can be achieved by limiting and collateralizing (with liquid collateral) any credit extension by the FMI. While we could wonder if the requirement to withstand the failure of the major participant is sufficiently stressful, FMI compared to banks do not face the type of liquidity risk induced by maturity mismatch.

One of the characteristics of the recent crisis was that otherwise liquid markets evaporated very quickly. Among the underlying reasons was a lack of transparency on the correct valuation and on the intrinsic risk of a number of asset classes (the "toxic assets") as well as on counterparties' exposure to these "toxic assets", thereby undermining the mutual trust and confidence which counterparties need in order to engage in transactions in the interbank market. This created stress and obstructed the proper functioning of otherwise very liquid markets. The FMIs had no such assets on their balance sheets and, as a rule, did not accept them as collateral, or only with dissuasive haircuts. As this was widely known in the market, the participants' confidence in the FMIs remained intact, and no liquidity was withdrawn from FMIs by participants. In some cases there were even periods when, due to this positive perception of FMIs by the market, some market participants deposited with FMIs far more cash than was needed as a normal working balance, as they preferred their excess cash liquidities to be deposited with the FMI rather than on the interbank market.

2. Lessons from the crisis: Approach to liquidity risk by supervisors

With respect to regulating liquidity risk, the bank supervisors' reaction to the crisis centred on two main aspects: development of principles for sound liquidity risk management, and development of metrics determining *minimum* levels of liquidity for internationally active banks.

The "Principles for Sound Liquidity Risk Management and Supervision" [(1)] (see box 1 for a selected list of principles of more direct relevance for FMIs) are addressed to both banks and supervisors. With respect to banks, the principles focus on the governance of liquidity risk management, the measurement and management of liquidity risk, and public disclosure. With respect to supervisors, the focus of the principles is mainly on the need for supervisors to assess banks' liquidity risk, to intervene when remedial action is required, and to communicate with other supervisors.

(1) Principles for Sound Liquidity Risk Management and Supervision, BCBS, September 2008.

Box 1 – Selected principles for the management and supervision of liquidity risk

Principle 1: A bank is responsible for the sound management of liquidity risk. A bank should establish a robust liquidity risk management framework that ensures it maintains sufficient liquidity, including a cushion of unencumbered, high quality liquid assets, to withstand a range of stress events, including those involving the loss or impairment of both unsecured and secured funding sources. Supervisors should assess the adequacy of both a bank's liquidity risk management framework and its liquidity position and should take prompt action if a bank is deficient in either area in order to protect depositors and to limit potential damage to the financial system.

Principle 8: A bank should actively manage its intraday liquidity positions and risks to meet payment and settlement obligations on a timely basis under both normal and stressed conditions and thus contribute to the smooth functioning of payment and settlement systems.

Principle 9: A bank should actively manage its collateral positions, differentiating between encumbered and unencumbered assets. A bank should monitor the legal entity and physical location where collateral is held and how it may be mobilised in a timely manner.

Principle 10: A bank should conduct stress tests on a regular basis for a variety of short-term and protracted institution-specific and market-wide stress scenarios (individually and in combination) to identify sources of potential liquidity strain and to ensure that current exposures remain in accordance with a bank's established liquidity risk tolerance. A bank should use stress test outcomes to adjust its liquidity risk management strategies, policies, and positions and to develop effective contingency plans.

Principle 11: A bank should have a formal contingency funding plan (CFP) that clearly sets out the strategies for addressing liquidity shortfalls in emergency situations. A CFP should outline policies to manage a range of stress environments, establish clear lines of responsibility, include clear invocation and escalation procedures and be regularly tested and updated to ensure that it is operationally robust.

Principle 12: A bank should maintain a cushion of unencumbered, high quality liquid assets to be held as insurance against a range of liquidity stress scenarios, including those that involve the loss or impairment of unsecured and typically available secured funding sources. There should be no legal, regulatory or operational impediment to using these assets to obtain funding.

Public disclosure

Principle 13: A bank should publicly disclose information on a regular basis that enables market participants to make an informed judgement about the soundness of its liquidity risk management framework and liquidity position.

The role of supervisors

Principle 14: Supervisors should regularly perform a comprehensive assessment of a bank's overall liquidity risk management framework and liquidity position to determine whether they deliver an adequate level of resilience to liquidity stress given the bank's role in the financial system.

Principle 16: Supervisors should intervene to require effective and timely remedial action by a bank to address deficiencies in its liquidity risk management processes or liquidity position.

The BCBS' "International framework for liquidity risk measurement, standards and monitoring" proposes two metrics for fixing the minimal level of liquidity. These two standards have been developed to achieve two separate but complementary objectives. The aim of the Liquidity Coverage Ratio is to promote the short-term resilience of the liquidity risk profile of institutions by ensuring that they have sufficient high quality liquid resources to survive an acute stress scenario lasting for one month. The Net Stable Funding Ratio has been developed to capture structural issues related to funding choices. Its objective is to promote resilience over longer-term time horizons by creating additional incentives for banks to fund their activities with more stable sources of funding on an ongoing structural basis.

3. Lessons from the crisis – approach to liquidity risk by overseers

There are three different sets of standards for FMI oversight, depending on the nature of the FMI: Core Principles for Systemically Important Payment Systems, Recommendations for SSS, Recommendation for CCPs. It is remarkable that none of these three sets contains a single standard that is uniquely devoted to liquidity risk. Credit risk and liquidity risks are dealt with jointly in one standard in all three sets (see box 2). Although the wording of the standard on credit/liquidity risks is different between the three sets of standards, the basic concept behind them is common and quite straightforward: each FMI that implicitly or explicitly provides credit to its participants should be able to withstand the failure of the participant with the highest debit position.

Box 2 – Oversight standards/recommendations regarding liquidity risk

Core Principles for Systemically Important Payment Systems- Core principle V

A system in which multilateral netting takes place should at the minimum be capable of ensuring the timely completion of daily settlements in the event of an inability to settle by the participant with the largest single settlement obligation.

Recommendations for SSS-Recommendation 5: Financial resources

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.

Recommendation for CCPs-Recommendation 9: CSD risk controls to address participants' failures to settle

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

As announced in a statement dated 2 February 2010, the CPSS and IOSCO have launched a joint effort for a comprehensive review of the existing standards for FMIs (including payment systems, securities settlement systems and central counterparties). The statement also underlines the importance of robust FMIs for reducing systemic risk and for helping markets to remain liquid even during times of financial stress.

In the context of this review, the question is whether the principles and ratios set up by the BCBS for liquidity risk might be of help for the CPSS-IOSCO review.

From the perspective of FMIs, the Liquidity Coverage Ratio and the Net Stable Funding Ratio might be too bank-specific, and too focused on the maturity mismatch to be of use for the liquidity risks of FMIs. On the other hand, some of the principles for sound liquidity management and supervision are clearly relevant (or contain elements that are relevant) for FMIs, the principal points being:

- the importance of paying attention to *intraday* liquidity;
- the need to set up a formal liquidity *contingency* plan;
- the requirement to conduct *stress tests* on a regular basis for a variety of stress scenarios, to identify sources of potential liquidity strain and to adjust liquidity risk management strategies or policies.

This last point is particularly relevant. The present standards require FMIs to be able to resist one specific scenario: the failure of the participant with the biggest debit position. With the experience of the financial crisis, it seems that on this point the standards should be broadened, and that FMIs should be able to withstand a wider variety of shocks than just the failure of the biggest debtor. Examples of such shocks would be:

- financial or operational problems at the FMI's liquidity provider or at the FMI's nostro agent;
- financial or operational problems affecting various participants or classes of participants having the same risk profile;
- spill-over effects between participants of the FMI;
- impact of market shocks on collateral values;
- unavailability of some of the FMIs' liquidity resources.

While the FMIs coped relatively well with the liquidity shortage resulting from the financial crisis and, in that way, contributed to containing the effects of the crisis, there is no justification for complacency. The crisis has also shown that assumptions underlying the current overseers' standards for liquidity risks at FMIs may be too narrow. This need for new liquidity risk standards should be taken into account in the ongoing review of FMI standards by CPSS-IOSCO.

Assessment and lessons of the operational crisis exercise conducted with Atos Worldline

Introduction

While the recent crisis underlined the financial shocks which could endanger the stability of the financial system, that stability may also be threatened by operational events. An operational event, operational crisis, or business continuity crisis (Business Continuity Planning or BCP) means any incident causing serious disruption affecting the smooth operation of the financial system, such as natural disasters, acts of terrorism, epidemics, cyber terrorism, social unrest, etc.

In Belgium, the coordination of the response by the financial authorities to a crisis situation with a systemic dimension, be it financial or operational, is organised by the Financial Stability Committee (FSC), which is a coordinating body comprising members of the Board of Directors of the National Bank of Belgium (NBB) and the Banking, Finance and Insurance Commission (CBFA), plus a representative of the Minister of Finance. In regard to Business Continuity Planning, the FSC has identified the functions which are critical for the smooth operation of the financial system as a whole, and has issued some recommendations. The latter concern aspects such as the coordination of communication in the case of an incident, recovery and resumption time objectives (RTO), and the establishment of an IT architecture enabling the RTOs to be respected in the case of a regional incident, i.e. an incident affecting a geographical area presenting the same levels of operational risks.

One of the recommendations which the FSC made in 2004 encourages the organisation of operational exercises involving the financial authorities (NBB, CBFA and FSC) and critical players in the Belgian financial sector. In fact the FSC's recommendations regarding BCP stipulate that all critical financial infrastructures and institutions should conduct internal tests under realistic conditions at least once a year. In addition to internal testing by the institutions, the FSC states that it is also important to conduct tests which involve the main counterparties, so as to ensure in particular that one emergency centre can communicate with another. It also recommends regular testing of the non-technical aspects of the emergency plans, e.g. communication within the financial sector, external communication and the other aspects of crisis management.

The FSC's recommendations on BCP are based on best practice in that field. The CBFA and the NBB oversight unit, responsible respectively for the supervision of institutions and critical infrastructures, verified that the FSC's recommendations on BCP had actually been implemented by the critical players. The time had come to focus on testing.

In that context, the FSC and Atos Worldline S.A. (AWL, formerly Banksys) got together to prepare the first crisis exercise involving the financial authorities and a critical player from the Belgian financial sector. Atos Worldline is the leading Belgian operator of electronic payment systems.

The first part of this article looks at the general context and the aims of the crisis exercise. The second part describes the practical organisation and the main characteristics of

the exercise, while the third part focuses on the scenario. The fourth part considers the main lessons drawn from the exercise, before the fifth part concludes by looking ahead to future operational crisis tests.

1. General context and aims of the exercise

The FSC's crisis procedure tests were devised gradually, proceeding from the simplest level to the more complex. From that point of view, tests on the various aspects of the FSC crisis procedures had already been conducted previously, such as the checks on the contact data of the members of the crisis units, tests on crisis locations, or tests on the form to be sent to the financial authorities in the event of a crisis. We have now entered a new phase in that gradual process: a test on all the operational crisis procedures with a critical player external to the authorities.

On 25 September 2009, the first crisis exercise between the authorities and a critical player from the Belgian financial sector involved participants from the NBB, the CBFA, the FSC secretariat, the Ministry of Finance (Treasury) and AWL.

The exercise aimed to test and assess the working of the operational crisis procedures established by the FSC in the context of a crisis originating in a critical player, in this instance AWL, and the interactions between the players concerned. In that connection, the points to be checked were as follows:

- the operational state of the crisis management procedures of each participating institution;
- the working of the crisis procedure established by the FSC (see box 1, Escalation procedure);
- the quality of the communication channels between institutions and within participating institutions;
- the speed of response in the face of critical situations;
- the adequacy of the decision-making processes in the face of a crisis situation;
- both internal and external communication.

Box 1 – Escalation and communication procedure in the event of a BCP crisis affecting multiple critical institutions

The procedure planned for BCP crises is in line with the recommendations adopted by the FSC on 18 October 2004 in regard to business continuity planning (BCP), and applies when the critical players are unable to resume their critical activities within the times recommended by the FSC. It is intended to complement the existing procedures between the critical players and the NBB, on the one hand, and the CBFA, on the other, each within the framework of its own responsibilities.

1. FSC crisis organisation

In order to cope with BCP crises which may have a significant impact on the smooth operation of the Belgian financial sector, the FSC has made provision for three units, namely the operational crisis unit, the assessment unit and the communication unit.

The operational crisis unit comprises representatives of the CBFA, the NBB, the Finance Minister's advisers and Ministry of Finance, and has to arrange coordination during or immediately after an operational incident affecting multiple institutions, so as to set up measures and ways of dissipating the effects which go beyond the individual emergency plans of the institutions concerned. The operational crisis unit is not involved in the operational crisis management of the institutions affected.

The main function of the assessment unit is to provide the operational crisis unit with fast, accurate information on the incident's impact on the operation of the institutions directly affected by the crisis and the operation of institutions not directly affected by the crisis.

The function of the communication unit, acting in the name of, and in consultation with, the operational crisis unit and in collaboration with the operational services of the CBFA and the NBB, is to provide adequate information for the various target sections of the public (foreign financial authorities, critical players, the financial sector, the media, etc.) regarding the development of the crisis, the measures taken by the operational crisis unit and the proposed measures to dissipate the effects.

2. Ambit of the three crisis units

These crisis units can only be activated if an operational incident affects or could affect the smooth operation of the Belgian financial system. An operational incident is considered to affect multiple institutions once it is apparent that the institutions affected will no longer be able to respect the RTOs adopted by the FSC, or that the crisis and its consequences may seriously disrupt the smooth operation of the other critical players. Depending on the type of crisis, the officer in charge at the NBB or the CBFA who is responsible for the supervision of the institution(s) affected may decide to convene not only the operational crisis unit but also the communication unit and all or part of the assessment unit.

3. Activation of the three crisis units

The operational crisis unit can be activated in the case of a bottom-up crisis or a top-down crisis. A bottom-up crisis is one which affects one or more critical players in the financial sector (example : IT breakdown or targeted terrorist attack, as in the exercise scenario) while a top-down crisis is one which does not solely affect the financial sector but may also have systemic implications in the financial sector (example : general electricity supply breakdown).

4. Stages in the FSC escalation procedure

The FSC escalation procedure in the case of an operational crisis consists of the following 6 stages :

- phase 1 : announcement of the incident ;
- phase 2 : decision by the NBB or CBFA officer in charge (bottom-up crisis) or by the representative of Ministry of Finance (top-down crisis), to activate the operational crisis unit ;
- phase 3 : convening, at an agreed location, of the members of one or more crisis units (operational crisis unit, assessment unit and communication unit) ;
- phase 4 : contact and consultation with the institutions affected and with those not directly affected ;
- phase 5 : if necessary, request for support from the Ministry of the Interior Crisis Centre and/or contact with foreign financial authorities ;
- phase 6 : transmission of information to the outside world.

During the exercise, the participants had to activate their crisis management procedure, activate the communication channels between the supervisory authorities and the critical player, send information or requests for information to external players (e.g. local police, the media, etc.) whose role was played by members of the organising committee, and take or recommend measures within a very short timescale. The participants also had the opportunity to test their crisis locations, their crisis facilities and the emergency plan in the case of non-availability of the electronic payment systems operated by AWL (see box 2, Banknotes emergency plan).

Box 2 – Banknote emergency plan
Manual of procedures in cases of prolonged non-availability of electronic payment systems operated by Atos Worldline (AWL)

Among the operational crisis scenarios for which it seemed worth developing a contingency plan, the FSC considered the possibility of facing non-availability of payment systems operated by AWL.

More commonly known as the "emergency banknote plan", the "emergency plan in the event of total, prolonged non-availability of the Atos Worldline electronic payment platform" aims to minimise the consequences for consumers, the financial system and the Belgian economy in general of non-availability of the electronic payment system in the retail trade, or the fact that customers cannot use a cash machine operated by another bank or by another operator, other than their card issuer.

In principle, this emergency plan will only be implemented once the breakdown is expected to last at least 3 days.

The emergency plan is an essential guide for the BCP officers of the critical players concerned, designed to facilitate the implementation of a series of emergency measures and seeking to channel communication before and during the crisis. It describes the measures to be taken by the NBB's Central Cash Office and the FSC, as well as the measures to be taken by the banks, such as stocking up ATM's with the maximum quantity of banknotes, or preparing to meet additional requests for cash at the counter.

In this type of crisis, AWL still takes the lead in regard to communication vis-à-vis its customers and the media. For example, AWL may advise retailers to stop bringing their small denominations back to their bank, and encourage the use of alternative means of payment and the Proton electronic purse. Depending on the situation, AWL could also remind consumers that Proton remains operational, that payments by bank card in supermarkets are generally still possible, or that it is preferable to pay the exact amount in cash.

2. Practical organisation and main characteristics of the exercise

An organising committee comprising members of the NBB, the CBFA, the FSC secretariat and AWL was set up in order to prepare the crisis exercise, and to play various roles on the day of the test.

Thus, the exercise tested the interaction between participating institutions and external organisations whose role was simulated by the members of the organising committee. These included the local police, the Ministry of the Interior's Crisis Centre (a body set up to assist the federal government in the planning and interdepartmental management of crises and major incidents), the big banks, various federations, foreign central banks, retailers, consumers (the general public) and the media.

The elements of the scenario were submitted gradually to the recipients placed on predefined lists: NBB, CBFA, Ministry of Finance, financial authorities (NBB+CBFA) and AWL.

The participating institutions were authorised to contact one another bilaterally or multilaterally during the exercise whenever they considered it necessary. In order to facilitate the exercise debriefing, participants were asked to give preference to using e-mail for their communications. They were also permitted to ask questions and exchange information with external organisations or institutions whose roles were simulated by the organising committee.

The exercise lasted one day, from 08.00 to 15.00 hrs. On completion of the exercise, each participant was asked to fill in an exercise evaluation questionnaire.

3. Exercise scenario and progress of the test

The exercise took place on 25 September 2009. It was launched by the simulation of a fictitious explosion at 07.50 which took out AWL's IT centre. According to the scenario, the building had not suffered too much damage

but the explosion had made access difficult. Since few people were there at that time of the meeting, there were no casualties to worry about. Around an hour later, terrorists threatened to set off a chemical device close to the place where the first explosion had occurred. The police therefore evacuated the buildings and established a security cordon within a 4 km radius of AWL. Since the back-up centre is less than 2 kilometres from the primary centre, both centres had to be evacuated. The security cordon around AWL's primary and secondary IT centres caused prolonged uncertainty over when normal business would be resumed, placing the participants in the situation defined for implementing the "Banknotes emergency plan".

The back-up centre's applications should have been able to continue operating remotely. However, widespread traffic congestion and a technical problem, in particular, prevented AWL staff from establishing remote access contact and relaunching the electronic payment systems. The consequences of the failure led to indefinite suspension of debit and credit card payments and the CARD STOP[1] service. Only Proton and banknote withdrawals at 'self-bank' automatic bank branches still functioned.

On the basis of the information communicated by AWL and in view of the systemic risk, the financial authorities launched the crisis procedure, convening the operational crisis unit and ensuring a coordinated response. Various NBB departments had a particular role to play. Thus, the NBB Oversight unit maintained contact with AWL and with the foreign financial authorities, the communication service took charge of organising a call centre and circulating press releases, etc., the Central Cash Office launched the implementation of the "Banknotes emergency plan" (situation report and assessment of cash needs with cash transport firms and banks, extension of bank opening hours, etc.), the Security-Surveillance service performed its role as the *Single Point of Contact* (SPOC) and responded to requests from the Central Cash Office, and the Non-cash Payments service was responsible for monitoring contact with AWL on the data files to be forwarded to the CEC, the centre for exchange and clearing of small-value transactions.

AWL tested its internal escalation procedure, its involvement in the FSC escalation procedure and its crisis communication.

(1) CARD STOP is a central service set up over 15 years ago to block payment cards and other payment products. It is run by AWL and intended for card issuers wishing to offer their customers a service enabling them to block their cards and other means of payment at any time, day or night.

Once AWL's technical problem was solved, remote access was restored from 13.05 hrs, followed by a gradual return to normal at around 13.50 hrs. The police lifted the security cordon at 14.55 hrs.

Numerous responses and requests for information were inserted in the scenario for the exercise participants (AWL, the NBB, the CBFA and the FSC). These questions came from banks, the press, retailers, consumers, foreign financial authorities, etc., all roles simulated by members of the organising committee.

4. Main lessons drawn from the exercise

The FSC-Atos crisis exercise revealed that the participants had mastered the FSC escalation procedure and operational crisis procedures. All the phases of the FSC escalation procedure (see box on the escalation procedure) were tested: notification of the incident to the SPOC, meeting of the crisis units, contact with the institutions affected, the Crisis Centre and the outside world, etc. The testing of the escalation procedure and the communication chain enabled everyone to check the procedures in the operational crisis manual. In addition, the exercise highlighted the importance but also the difficulty of concerted communication between the financial authorities and of the speedy allocation of duties relating to crisis communication in accordance with the agreed procedures. The exercise demonstrated the benefits of regular communication with the outside world in the case of new information, and the need for regular, speedy contact with the critical players in a crisis. The exercise demonstrated the usefulness of having, in addition to operational crisis management units, a small responsive and flexible entity, responsible for permanently monitoring the crisis as it unfolds. Finally, AWL took advantage of the exercise to conduct a successful test on its escalation procedure in the event of a crisis, and its crisis communication and information methods.

5. The future

A future FSC operational crisis management exercise could provide the opportunity for extending the scope of the test to include a number of critical players in the Belgian financial sector or key external operational crisis correspondents (government crisis centre, local police, etc.). In any case, the tests on the Financial Stability Committee's operational crisis procedures will need further development.

Thematic Articles

Building a more stable financial system: regulatory reform in a post-crisis perspective

Peter Praet

Introduction

Much has been written about the causes of the recent financial crisis, which was triggered in 2007 by widespread losses on securitisation transactions involving U.S. subprime mortgages, and reached an acute phase with the failure of Lehman Brothers in September, 2008. Several factors have been identified as playing a major role in the massive build-up of risk in the years preceding the crisis and the consequent losses once the crisis erupted. Interest rates, which were held at a low level over a long period, combined with macroeconomic imbalances to give rise to a widespread "search for yield" by investors. Complex financial products, whose risk was not well understood by either rating agencies or investors, helped to satisfy this demand for yield. Banks took on high degrees of leverage – all the while reporting strong regulatory capital ratios based on risk-weighted assets – by increasing funding with significant maturity mismatches and by creating off-balance-sheet vehicles requiring only minimal or no regulatory capital charges. Finally, weak risk management and governance systems in financial institutions meant that managers did not always understand the risks their institutions were taking, nor that many of these risks were excessive.

All of these factors resulted in a crisis that was truly systemic and global. Markets for virtually all assets dropped sharply. Sudden dry-ups of market liquidity paralysed markets such as those for asset-backed commercial paper or short-term interbank loans that had previously been considered safe. Banks around the world were forced to take colossal losses on traded assets, and they faced funding difficulties that threatened their survival. Central banks poured liquidity into the markets, and many governments finally had to intervene with public money on an enormous scale to rescue large financial institutions and, indeed, avoid a meltdown of the entire financial system.

These events have resulted in a sea change in the mindset, views, and focus of financial authorities, leading to what may be described as a new regulatory and supervisory culture. As a result, a number of regulatory reforms have been proposed or are being formulated and, if implemented, are likely to have far-reaching consequences for the financial sector. The reforms touch on all of the key areas relating to the maintenance of financial stability – supervision, regulation, and crisis management – reflecting a holistic response to the weaknesses exposed by the crisis. It is necessary to take a broad approach, which addresses not only the issue of inadequate capital and liquidity buffers of financial institutions going into the crisis but also the failure of authorities to detect excessive risk taking, difficulties encountered in dealing with distressed banks once the crisis erupted, and the need to reduce moral hazard created by the perception that systemically important institutions will be bailed out.

This article focuses on proposed reforms in the areas of banking regulation and crisis management. In particular, it discusses how the crisis has transformed some of the views and approaches of financial authorities, and the relation between the evolving, post-crisis consensus and proposed reforms of the Basel II framework that have been put forward by the Basel Committee on Banking Supervision. In addition, while these proposed changes to banking regulation aim to strengthen the resilience of financial institutions and to avoid a future crisis, efforts are also needed to improve authorities' ability to effectively deal with distressed financial institutions or resolve

a crisis when it occurs. A number of critical reforms to crisis management and resolution frameworks are thus discussed in this context. Section 1 describes the pre- to post-crisis evolution of regulatory views. Section 2 discusses banking reforms that have been proposed in light of this evolution. Section 3 then turns to reforms of crisis resolution frameworks. Section 4 concludes.

1. Evolving regulatory paradigms and practices

This section characterises the pre-crisis to post-crisis evolution of views along several important dimensions, including the focus of regulation, the regulatory framework, and underlying assumptions about markets.

1.1 Regulatory focus

Perhaps the most striking outgrowth of the crisis is a change in the focus of banking regulation, from a narrow concern with the resiliency of individual institutions (the "micro-prudential" approach) to a broader preoccupation with the entire financial system (the "macro-prudential" approach). The crisis has vividly illustrated that the distress or failure of certain "systemically important" financial institutions can generate risk in the entire, global financial system.[1]

In addition, the potential impact that failed institutions can have on the financial system appears to have intensified over time, partly as a result of heightened interconnectedness between institutions which has taken increasingly diverse, complex, and opaque forms. In the run-up to the crisis, significant exposures between financial institutions occurred not just through traditional inter-bank markets but also through other types of exposures such as derivatives (e.g., credit default swaps), which were typically traded over the counter and could often be quite complex. Proposed regulatory reforms aiming to mitigate problems with interconnectedness and the potential impact of systemically important institutions include increased capital requirements for exposures by banks to large financial institutions, increased capital for counterparty credit risk, and consideration of special policies such as capital or liquidity surcharges for systemically important financial institutions.

Systemic risk, however, does not arise solely as a result of the failure of systemically important institutions. Other sources of systemic risk include common exposures by many institutions to similar assets or risks, externalities linked to "herd" behaviour of market participants, or second-round, feedback effects due to shocks. For example, asset price declines that may result from de-leveraging by one or more large financial institutions following a shock may increase losses and further exacerbate the distress at the initial institutions or generate distress at other institutions, leading to a vicious spiral of asset price declines and de-leveraging activity. One of the challenges of macroprudential supervision will be the early identification of potential risks to the system along these lines.

Finally, the level of risk in the financial system varies over time. Indeed, it has long been observed that the behaviour of financial institutions 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, face increased capital requirements, and they contract their lending. These cyclical patterns in lending can accentuate the business cycle (a phenomenon known as procyclicality), resulting in an excessive build-up of risk in booms and an associated realisation of large losses in recessions. Many observers have argued that developments in the financial system prior to the crisis heightened procyclicality, and consequently, the severity of the crisis. Current regulatory reforms aimed at mitigating procyclicality include a proposal to create a cyclical capital "buffer", or amount of capital above the regulatory minimum. Financial institutions would be required to build up the buffer in good times, and they could then draw on the buffer to cover losses in unfavourable times.

1.2 Regulatory framework

The decade preceding the crisis saw the development of regulatory standards based on industry best practices. This best-practice approach to regulation involved continual contact between regulatory bodies and representatives of the financial industry, with the aim of improving regulation by adapting it to changes in banking and risk management practices, while maintaining an internationally level playing field. (See BCBS, 2006). A prime example of this approach is given by the use in the Basel II framework of risk assessments generated by banks' internal systems, as inputs to the calculation of risk-weighted assets, which are then used to determine minimum regulatory capital requirements.

Another reflection of the best-practice approach to regulation is the use of a value-at-risk (VaR) framework for establishing minimum capital requirements. The minimum requirements were calibrated so that capital would

(1) See Castro and Ferrari (this FSR) for a discussion of issues relating to systemic risk and the systemic importance of institutions.

be sufficient to cover losses up to a particular percentile (99.9 p.c. for loan portfolios) of the loss distribution for a typical bank.[1] In theory, this would suggest that banks hold enough capital to cover losses in all events except those which could be expected to occur once in one thousand years.

Yet, in order for a regulatory approach based on best practices to succeed, market best practices must be both sound and robust. As the crisis has illustrated, however, VaR methodologies suffer from a number of shortcomings. In particular, VaR estimates are subject to significant model risk, embodied either in assumptions such as those relating to default probabilities or default correlations among the loans in a portfolio, or in the reliance on historical data – often quite recent – for estimating the loss distribution for traded assets. Changes in the underlying assumptions or data can in fact produce significant changes in the estimated distribution of losses and, hence, in the necessary amount of capital.

The post-crisis recognition of the importance of model risk has resulted in calls for greater amounts of capital than those implied by VaR analyses, in order to ensure that capital does indeed serve as an effective cushion in absorbing losses of the institution as a going concern. In addition, there is a perceived need to strengthen the loss-absorption capacity of the instruments that are included in the regulatory definition of capital. A number of proposed regulatory reforms thus appear to be aimed at addressing these issues: an increase in the quality of regulatory capital; expansion of the risks for which capital requirements are calculated and imposed; and imposition of a leverage ratio (the ratio of capital to total assets), a measure that depends upon total assets rather than risk-weighted assets and thereby does not suffer from model risk associated with estimating capital based on a VaR approach.

Another necessary condition for the best-practice regulatory approach to succeed is that there must be no risk of regulatory "capture". Regulators must remain sufficiently sceptical to permit them to successfully challenge bank models, practices, and processes that could have a potential impact on risk. For instance, a number of bank practices prior to the crisis, such as the booking of assets with significant credit risk in the trading book rather than the banking book or the creation of off-balance-sheet vehicles like SIVs, were undertaken for the purpose of reducing regulatory capital requirements. One of the aims of the regulatory proposal of a minimum leverage ratio is in fact to limit the impact of this type of "regulatory arbitrage".

(1) The time horizon over which losses are calculated depends on the type of asset.

1.3 Assumptions

One of the key assumptions underlying regulation in the pre-crisis period was that markets are "sufficiently" efficient, in that market prices provide accurate indicators of economic value and risk, that financial innovation unambiguously improves efficiency, especially when subject to competition, and that market discipline is a valuable complement to – and sometimes more effective than – supervision. This view was also reflected in the move to adopt fair value accounting principles, despite the reservations expressed by some central banks and supervisory authorities.

The crisis has prompted a critical re-examination of the efficient markets assumption. Authorities are now focusing more attention on the possibility of market failures, including development of irrational price "bubbles", negative externalities created by "herd" behaviour of market participants, and the existence of moral hazard or asymmetric information problems which result in weakened or ineffective market discipline. Such deviations from efficient markets can result in an overabundance of market liquidity or an excessive amount of leverage in certain periods, followed by sudden liquidity dry-ups or destabilising de-leveraging in other periods. Proposed regulatory reforms that should help to reduce the occurrence or impact of such variations are the imposition of minimum liquidity requirements and a minimum leverage ratio. More generally, the re-examination of the efficient markets assumption appears to have persuaded a number of observers that more reliance on regulation is warranted in the future (e.g., see Greenspan, 2010).

The role of financial innovation has also come under greater scrutiny. Many types of financial innovations have the effect of permitting an increase in leverage. Innovations can also create common exposures among institutions. For example, the tranching of securities backed by a pool of assets and the sale of the tranches to different institutions automatically create a common exposure of those institutions to the underlying pool of assets. The capacity of financial innovation to heighten common exposures among institutions was aptly demonstrated in the crisis by the securities backed by U.S. subprime mortgages. At the same time, the robustness of innovations in the event of a shock is, by definition, initially untested, and the ultimate distribution of risk achieved by the innovation may be quite opaque and difficult to predict. As a result, financial innovation can have a significant, sometimes unexpected, impact on financial stability. One of the regulatory responses to financial innovation relating to securitisation products that preceded the crisis has been to sharply raise capital requirements

for resecuritisations, which are complex securities whose payments are themselves backed by tranches of other securitisations. In addition, a fundamental review of the calculation of regulatory capital requirements for securitisations is currently ongoing.

2. Reforms of the Basel II framework

As mentioned above, authorities have adopted a broad approach in identifying the causes of the crisis and proposing measures to redress the associated weaknesses and failures. Chart 1 provides an illustration of the array of reforms that are being contemplated or proposed. The proposals encompass efforts to strengthen financial institutions' capital and liquidity buffers, to improve the incentives of financial institution managers with respect to governance and risk taking, and to adapt legal and organizational structures of financial institutions and markets to increase transparency and reduce the level of risk and to permit effective resolution of distress.

This section focuses on proposals devoted to strengthening financial institutions' capital and liquidity buffers. Several proposals for reforms to the Basel II framework have been formulated in a series of consultative documents issued by the Basel Committee in 2009 (see Basel Committee 2009a, 2009b, and 2009c). Some of these proposals are at an advanced stage, while others are more preliminary. Chart 2 illustrates the proposed reforms.

Section 2.1 discusses the reforms intended primarily to mitigate systemic risk. Falling in this category are policies relating to systemically important banks, loan-loss provisions based on expected loss, and countercyclical capital buffers. Section 2.2 reviews reforms designed to increase or improve the quality of capital, including rules relating to counterparty credit risk, exposures to large financial institutions, leverage, and securitisation. These reforms could be argued to aim primarily at strengthening the resiliency of individual institutions, although in some cases they also help to mitigate systemic risk. Finally, Section 2.3 describes proposed liquidity requirements, which represent a new addition to the framework. Table 1 at the end of section 2 presents a summary of the different reform proposals.

2.1 Macroprudential concerns and systemic risk.

The discussion of systemic risk in Section 1 points to two important dimensions: the cross-sectional dimension, focusing on a given point in time and taking into account, for example, externalities that would be imposed by the failure of a systemically important institution; and the time dimension, which relates to the variation of systemic risk over time and the procyclicality of the financial system. Proposed policies for systemically important institutions address the cross-sectional dimension of systemic risk, while proposals for forward-looking provisions and countercyclical capital buffers address the time dimension.

Policies for systemically important banks. The failure of a systemically important bank (SIB) can cause failures of

CHART 1 PROPOSED REGULATORY REFORMS

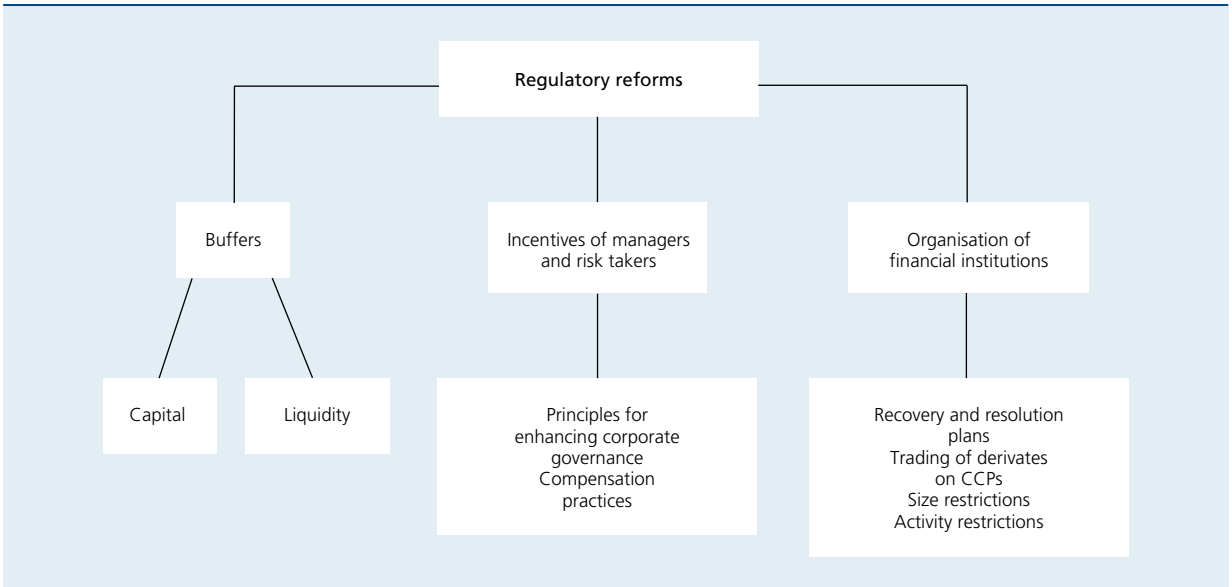
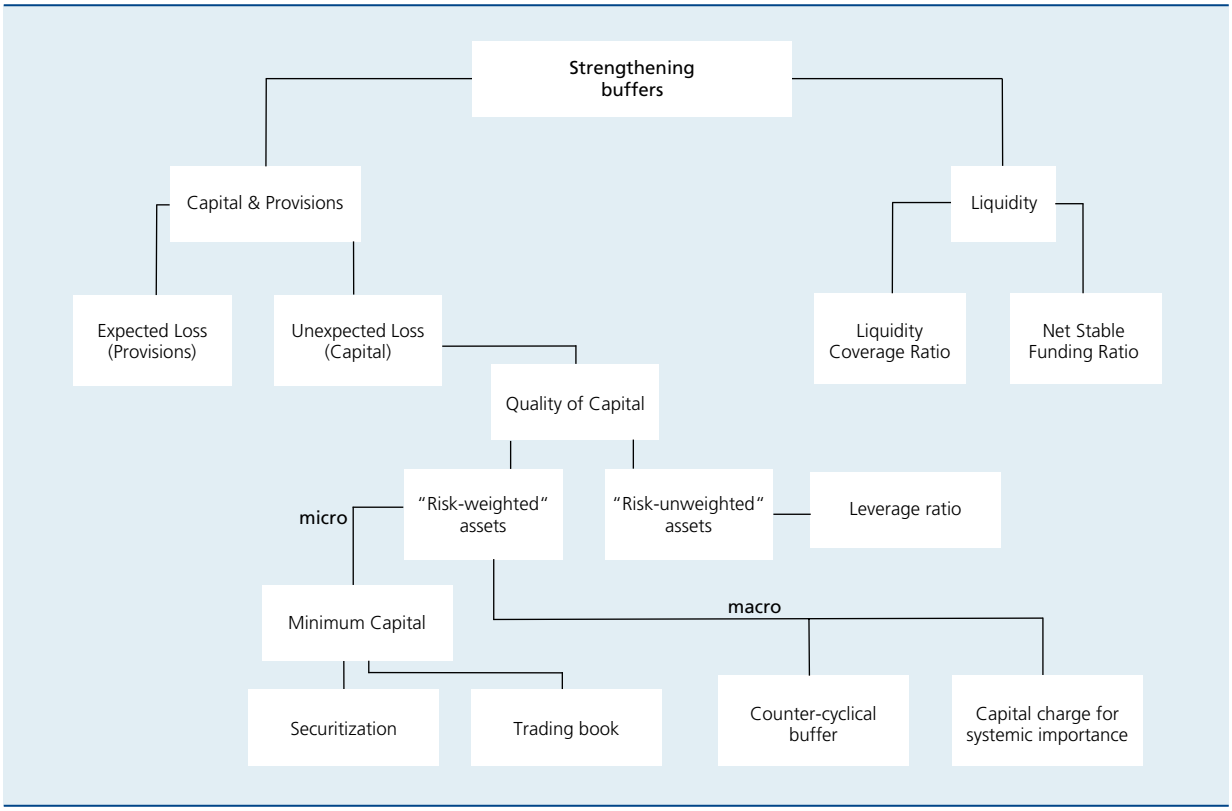


CHART 2 PROPOSED REFORMS FOR STRENGTHENING BANKS' CAPITAL AND LIQUIDITY BUFFERS



many other banks and widespread distress in the financial system. Hence, the failure of a systemically important bank generates costs that are not internalized by the bank. In light of this, the Basel Committee is currently considering the merits of applying special policies to systemically important banks. These policies could include a capital or liquidity surcharge or some other type of supervisory tool such as enhanced supervision. One of the objectives of imposing special policies would be to ensure that systemically important banks internalize at least a part of the costs their failure would impose on others. Policies applied to SIBs would also be intended to reduce the probability or impact of their failure.

One of the challenges arising with respect to the application of policies to systemically important banks is how to determine the degree of systemic importance. Although several methods for measuring systemic importance have recently been proposed, there is no consensus on the best method.[1] Data limitations also pose major difficulties.

Three important determinants of the systemic importance of an institution are its size, its interconnectedness with other institutions in the system, and the degree of substitutability of its activities.[2] Of these three factors, interconnectedness is arguably the most difficult to measure. For example, authorities currently do not have good knowledge of the network of exposures (especially cross-border) between financial institutions and, therefore, of the structure of the network or of the systemic importance of particular institutions.[3] This lack of knowledge applies as much to traditional interbank credit exposures as to more nontraditional exposures such as derivatives. Furthermore, the inability to accurately measure the network of direct exposures between institutions means that indirect exposures, and therefore the potential "second-round" effects of a shock, remain completely unknown.[4] Authorities will need to cooperate in the future to identify significant exposures of all types among large financial institutions.

Forward-looking provisions. Loan loss provisions are designed to help banks cover expected losses due to defaulting loans, whereas capital is intended to cover "unexpected" losses.[5] As a means of reducing the

(1) See Castro and Ferrari (this FSR) for a discussion of proposed measures of systemic important that make use of market data.
(2) See IMF/BIS/FSB (2009).
(3) The overall structure of the system can strongly influence its resistance to failure of an individual institution. See, e.g., Allen and Gale (2000) and Degryse and Nguyen (2007).
(4) The transfer of certain types of trades to central counterparties could be potentially helpful in this regard.
(5) Unexpected loss is defined as the difference between the VaR; i.e. the value of losses at some percentile (e.g., 99.9) of the loss distribution, and expected loss, which is the mean value of the loss distribution.

procyclicality inherent in the financial system, the Basel Committee is making a number of efforts to induce banks to undertake forward-looking provisioning. First, the Basel Committee is encouraging the International Accounting Standards Board to move to an approach of allowing banks to provision on the basis of expected losses, rather than the current practice of incurred loss provisioning. In addition, the Basel Committee is revising its supervisory guidance on sound provisioning practices to ensure consistency with the desired expected loss approach. The Committee is also reviewing the treatment of provisions in the Basel II framework, with the aim of removing any disincentives for banks to engage in sound provisioning. For example, shortfalls in stocks of provisions should now be deducted entirely from the common equity component of Tier-1 capital. Since provisions have traditionally been deducted from retained earnings, hence common equity, requiring that shortfalls also be deducted from common equity should eliminate an incentive for banks to under-provision.

Countercyclical capital buffers. Concern has been expressed over the years about the cyclical nature of behaviour of banks and other financial market participants, the potential for risk-based regulatory capital requirements to heighten procyclicality and the possible negative consequences for the real economy. As was noted in the previous section, these factors cause the level of risk in the financial system to vary over time. Although several measures were previously introduced in the Basel II Framework to mitigate cyclicality in capital requirements, the Basel Committee is now considering the possibility of requiring countercyclical capital buffers, as one way of better protecting banks from cyclical swings in risk, with the additional aim of weakening the transmission of shocks from the financial sector to the real economy.

Although the proposals are still at a very early stage, one potential way of determining countercyclical capital buffers would be as follows. A macroeconomic variable or group of variables would be used in each country to identify boom periods or periods of high credit growth. As a function of the realisations of the macro-economic variables, authorities in each country would decide upon the necessary level of the buffer above the minimum capital requirement in that country. The level of the required buffer would rise as the boom progresses, reaching some maximum requirement if the boom lasts for a long enough period.

The buffer required for a given financial institution would depend on the geographical distribution of its credit exposures. For financial institutions with credit exposures in multiple countries, the buffer would be calculated as the weighted average of the announced buffers in each of the countries in which the bank has exposures, where the weight for each country would be the percentage of the bank's total credit exposures accounted for by counterparts in that country.

One of the main challenges of implementing the proposal for countercyclical capital buffers would be to identify variables in each country that constitute reliable indicators of periods of excessive credit growth and of downturns, so that the build-up and release of the capital buffer in a given country truly coincides with movements of the cycle in that country. Because of this difficulty, the determination of the buffer in any given country would likely not be strictly rule-based but, rather, would be subject to the exercise of authorities' judgement.

2.2 Increasing and improving minimum capital

Counterparty credit risk. Increases in capital for counterparty credit risk and for exposures to large financial institutions represent reforms aimed at mitigating contagion due to interconnectedness. The strengthened requirements for counterparty credit risk help to reduce contagion arising from derivatives exposures, repos, and securities financing activities. These requirements are also intended to encourage greater use of central counterparties and exchanges for derivatives transactions. The reforms require banks to use stressed inputs (i.e., values of inputs during periods of stress) in the calculation of their capital charges for counterparty credit risk. The Basel Committee notes that this practice is similar to practices recently introduced in the framework for calculation of capital requirements for market risk of traded assets. The similarity should help to promote integrated management of market and counterparty risks. Standards for risk management for counterparty relationships, including collateral management and the treatment of wrong-way risk, are also being strengthened. [1]

Exposures to large financial institutions. Recent work by the Basel Committee suggests that large financial institutions are actually more interconnected than the Basel II capital charges would have implied. As a consequence, a proposal has been made to increase the assumed values of asset value correlations for large financial institutions in the formula for calculating capital charges for exposures to these institutions. This will result in an increase in minimum capital requirements for such exposures. The current proposal is to apply the higher correlation values to

(1) Wrong-way risk occurs when an exposure to a counterparty is adversely correlated with the credit risk of the counterparty.

regulated financial institutions (banks, broker dealers, and insurance companies) whose assets exceed 25 billion USD and to all unregulated financial institutions, regardless of size. Financial institutions are broadly defined to include highly leveraged firms such as hedge funds and financial guarantors.

Improving the quality of capital. The crisis revealed that a number of instruments that had been included in the regulatory definition of capital had insufficient capacity to absorb losses as long as the institution remains a going concern. Consequently, the key principle underlying the measures to improve the quality of capital is that common equity will become the predominant form of Tier 1 capital. Criteria for inclusion of instruments other than common equity in Tier 1 capital will be tightened. In addition, lack of consistency in the definition of capital across countries has motivated the Basel Committee to attempt to harmonize the allowed deductions and prudential filters. Varying levels of disclosure across countries regarding the level and nature of capital have also led the Basel Committee to propose measures to improve the transparency of Tier 1 capital.

Leverage ratio. A minimum leverage ratio (capital/total assets) is being proposed as a complement to risk-based capital requirements, in order to mitigate the impact of model risk in the calculation of the latter and to reduce the probability of a build-up of excessive leverage on banks' balance sheets, which could trigger negative asset price – deleveraging spirals following a shock. It is proposed that the capital included in the numerator of the leverage ratio be the high-quality definition of capital corresponding to the new Tier 1 definition. The measure of total exposures (assets) in the denominator will include off-balance sheet as well as on-balance sheet items. Exposure measures should preferably be accounting measures, adapted to ensure consistency across countries with different accounting standards.

Securitization. The issuance of complex financial products, such as ABS CDOs[1] and other resecuritizations, and the booking of these instruments in the trading book played a crucial role in the crisis and accounted for a significant percentage of banks' losses.[2] Recognizing that the capital requirements for trading book exposures did not adequately cover the risks of these complex instruments, the Basel Committee has issued revisions of the capital requirements for such assets (BCBS 2009d), sharply raising the required capital for resecuritizations held in the banking book or the trading book. Resecuritizations will also no longer be eligible for use as financial collateral. In addition, in order to reduce banks' reliance on external ratings, banks are required to conduct their own analyses of externally rated securitization exposures, as a supplement to the capital requirements based on the ratings. A number of additional measures to reduce reliance on external ratings and to eliminate negative incentives created by ratings "cliffs" in the Basel II framework have also been proposed.[3] Finally, the Basel Committee is undertaking a fundamental review of the securitization framework, which will likely result in a re-calibration of capital requirements for securitizations and a less prominent role for external ratings.

Capital linked to exposures in the trading book. The amendments to capital requirements for exposures in the trading book represent a response to the observation that the existing capital framework did not cover some of the key risks in the trading book. An incremental risk capital charge has now been added, in order to cover default and migration risk of the securities held in the trading book. The Basel Committee is also now requiring the use of a stressed value at risk for determining capital charges for market risk. The Committee also makes clear that regulators have the ability to require institutions to adjust asset valuations in cases where there is uncertainty in realizable values of assets due to illiquidity. Finally, banks must justify their actions relative to factors that are taken into account in pricing models but then excluded in calculations of value at risk.

2.3 Liquidity requirements

The Basel Committee (2009a) has proposed two quantitative ratios for the determination of banks' liquidity requirements. The first, the liquidity coverage ratio, is intended to ensure that banks have sufficient high quality, unencumbered liquid assets to survive an acute, 30-day stress scenario specified by supervisors. The requirement is that the stock of high-quality liquid assets must exceed the estimated net cash outflows of the 30-day period. The scenario proposed by the Basel Committee for determining the liquidity coverage ratio contains several features resembling the liquidity shocks that occurred during the crisis. These include a combined system-wide and idiosyncratic shock, loss of wholesale funding capacity, loss of ability to obtain short-term secured funding for all but high-quality liquid assets, etc. Which assets qualify as high-quality liquid assets will be determined after analysis of the results from an ongoing quantitative impact study.

(1) ABS CDOs are collateralised debt obligations (tranched securities) backed by a pool of tranches from other asset-backed securities transactions, primarily mortgage-backed securities.

(2) According to the Basel II framework, the trading book should consist of positions in financial instruments and commodities held either with trading intent or in order to hedge other elements of the trading book. To be veligible for trading book capital treatment, financial instruments must either be free of any restrictive covenants on their tradability or able to be hedged completely.

(3) Ratings cliffs arise when a small change in rating results in a substantial increase in capital requirements.

TABLE 1 PROPOSED REFORMS TO BASEL II FRAMEWORK

Proposed reform	Description
Policies for systemically important banks	Development of approaches for measuring systemic importance of institutions. Consideration of policy options for reducing probability and impact of failure of systemically important banks.
Forward-looking provisions	Revision of supervisory guidance to ensure consistency with an expected loss approach to provisioning. Shortfalls in stocks of provisions should now be deducted entirely from the common equity component of Tier-1 capital, since additions to provisions are deducted from retained earnings, hence common equity.
Countercyclical capital buffers	Impose a build-up of capital buffers above the minimum in good times, and allow a draw-down of the buffer in bad times. Macroeconomic or system-wide variables would be used by supervisors as indicators of good times and bad times.
Counterparty credit risk (CCR)	Increase capital for counterparty credit risk linked to OTC derivatives, repos and other securities financing transactions. Use of stressed inputs in formula for calculation of minimum capital requirement CCR. Capital charge for mark-to-market losses due to falling creditworthiness of a counterparty.
Exposures to large financial institutions	Increase capital for exposures to large financial institutions by increasing correlation parameter in formula used for calculation of minimum capital requirement.
Improve quality of capital	Increase the loss-absorption capacity of Tier-1 capital. Common equity the predominant form. Harmonization of deductions and prudential filters.
Leverage ratio	Impose a minimum requirement of capital to total assets, including off-balance sheet items. Based on accounting measures, adjusted to account for cross-country differences in accounting rules.
Securitizations	Increase capital requirements for complex securitization exposures. Review of capital requirements for securitization and reliance on ratings.
Trading book	Use of stressed value-at-risk for determining capital requirement for market risk. Banks must justify any exclusion of factors from value-at-risk calculations that were included in pricing models. Regulators may require banks to adjust valuations for illiquidity.
Liquidity requirements	Impose two liquidity requirements: a 30-day coverage ratio, to address short-term disruptions; and a stable funding ratio.

The second liquidity ratio is the net stable funding ratio, which is intended to increase the longer-term resilience of banks to shocks by fostering more stable sources of funding. This requirement sets a minimum level of stable funding based upon the liquidity characteristics of the institution's assets over a one-year horizon. The rule is that the available amount of stable funding must be at least as great as the "required" amount of stable funding, which is determined on the basis of supervisory assumptions regarding the liquidity characteristics of on and off-balance sheet exposures, including securitisation pipelines and investment banking inventories. Available stable funding is defined as the sum of the institution's capital, preferred stock with maturity no less than one year, liabilities with maturities of no less than one year, and the portion of "stable" non-maturity deposits which would be expected to remain with the institution during a prolonged stress event.

3. Crisis resolution frameworks

In addition to revealing cracks in the crisis prevention framework, the crisis has highlighted significant weaknesses in crisis management arrangements in many countries. These weaknesses were particularly apparent in the case of cross-border financial institutions, yet even for domestic banks the crisis resolution framework often proved inadequate. Given that national crisis management frameworks were not designed to accommodate the resolution of cross-border institutions, the crisis gave rise to a series of ad-hoc, uncoordinated measures, in many

cases resulting in the ring-fencing of activities, questions about distortion of competition, or higher costs of resolution than would have occurred with more cooperative solutions. Much effort is currently being undertaken to try to bolster the cross-border crisis management framework. As noted by the European Commission, Europe needs a strong regulatory framework that covers prevention, early intervention, bank resolution and winding up. (1)

With respect to both national and cross-border crises, authorities need an adequate toolkit for intervening early in a distressed institution and for achieving an efficient resolution of the problem. One of the most effective measures would be the passage of special banking resolution or insolvency laws that would provide specific powers to authorities, including:

- the power to take control of distressed financial institutions, implying the ability to give instructions to the institution's management and bypass its board of directors;
- the power to transfer some activities of a financial group to another entity, which could be a private sector purchaser, a "bad bank", or a government-run bridge bank;
- the power to transfer all or part of the shares of an ailing financial institution to a private sector purchaser or temporarily to the government;
- the power to require certain stakeholders, such as subordinated debtors, to bear some of the costs of any rescue operation;
- the power to influence the future business strategy of the institution and its risk appetite.

Many countries do not have specific legal provisions for bank insolvency; insolvent banks are treated identically to nonfinancial firms under company insolvency law. This identical treatment ignores critical differences in the timing and impact of the insolvency of banks relative to nonfinancial firms, and it ties the hands of financial regulators in intervening in a distressed bank to prevent its insolvency or to soften its impact on the financial system and the economy.

At the same time, any special bank insolvency law must strike a balance between shareholders' and stakeholders' rights on the one hand and the common interest on the other. In particular, strict limits and safeguards must be set for authorities' recourse to the exceptional powers. Determination of the trigger for authorities' intervention is also critical. The overall objectives of such legislation must be to maintain and enhance public and market confidence in the stability of the financial system, to foster private sector solutions and minimise the use of public funds, and to limit moral hazard arising with respect to systemically important financial institutions and the belief by market participants that these institutions will be rescued if they encounter distress.

In addition to the provision of special powers to authorities via special bank insolvency laws, efforts are under way to have large cross-border financial institutions devise recovery and resolution plans. These plans are sometimes referred to as "living wills". The recovery plan focuses on how the bank could can resolve distress, identifying for instance, strategies to reinforce the capital or liquidity position of the bank. It may also, however, go much further, specifying how certain business lines could be discontinued or units sold.

The objective of the resolution plan is to aid authorities in winding up the institution if the recovery plan fails. The plan should facilitate the intervention of authorities in closing the institution and/or in transferring activities or deposits to other institutions. This plan should define, among other things, potential resolution proposals, how the bank will provide necessary data to authorities so that they can evaluate the resolution options, and the potential obstacles that could arise in implementing the resolution strategy. (2)

As a consequence of the living will, authorities may require the institution to simplify the legal structure of the group, to introduce firewalls between different business lines, or to reduce the interconnectedness between the different entities of the group. The living will is drafted by the institution itself but is subject to a review by authorities. It should be regularly updated, to take account of changes in the group's structure, activities, and risks.

Finally, another crucial issue that must be addressed with respect to the resolution of cross-border crises is that of burden sharing. The debate on burden-sharing has been passionate at times, and there are many reasons for the sensitivity of the topic. In the first instance, ex ante burden sharing agreements – i.e., agreements that specify a sharing rule ex ante, before a crisis has occurred – are currently infeasible (3). Nevertheless, the crisis has demonstrated that ex-post burden sharing agreements are possible. In this context, Praet and Nguyen (2010) propose a stepwise approach to further advance the burden-sharing debate. These steps include: (i) defining and agreeing on the objective of burden-sharing; (ii) determining which aspects of the agreement can be set ex ante and which are necessarily left to an ex-post decision, and (iii)

(1) See European Commission (2009).
(2) For further detail see the box in Nguyen (this FSR).
(3) See Nguyen (2008) for a discussion of ex ante versus ex post burden sharing rules.

devising ways to facilitate decision-making, including enhancing information flows, increasing speed of procedures and fostering trust between authorities. Along these lines, cooperation in cross-country negotiations could be fostered by the presence of an authority not directly involved in the crisis, who could participate for the purpose of representing the common interest. This third party could have a passive role as observer, or if the interested parties agree and if need be, could be assigned a more active role as a facilitator or mediator. One might even contemplate specifically creating a European Resolution Authority. (1)

Conclusion

This article has examined the impact of the recent crisis on the views and focus of financial regulators, and it has discussed some proposed financial sector reforms. The reforms being contemplated and discussed by authorities cover all of the areas of supervision, regulation and crisis management, reflecting the need for a holistic response to the crisis. This article has concentrated on reforms linked to banking regulation and to the crisis management framework.

One of the outcomes of the ongoing reflection is that authorities are now more focused on systemic risk and on potential market failures than in the past. This has led to a new emphasis on macro-prudential supervision, which will likely require a number of institutional changes (some of which are currently under discussion) designed to foster closer co-operation between micro-prudential and macro-prudential supervisors. For example, while the risks arising from the collective behaviour of institutions can only be measured at macro level, detailed information needed for making this assessment and relating to the behaviour of individual institutions must be communicated by micro-prudential authorities. Similarly, although systemic risks can be partially addressed at the micro-prudential level, e.g., through requirements aimed at reducing interconnectedness or special policies applied to systemically important financial institutions, micro-prudential authorities can only make an imperfect assessment of systemic risk without measures designed specifically from a macro-prudential vantage point. Identification of the appropriate macro-prudential instruments and determination of the necessary degree and nature of interaction between macro-prudential and micro-prudential supervisors will be among the regulatory challenges going forward.

This article has discussed proposed reforms of the Basel II framework aimed at reducing systemic risk, as well as proposed changes to the framework designed to increase the breadth of risks for which banks must hold capital and to increase the quality of the capital and liquidity buffers that banks hold. In addition to these proposed changes to the Basel II framework, the Basel Committee has recently issued new, qualitative principles for enhancing corporate governance and an assessment methodology for supervisors in promoting sound compensation practices, in line with the principles for sound compensation practices issued by the Financial Stability Board in 2009. These documents not only define best practices in the critical areas of governance and compensation but also set out supervisory approaches for assessing banks' compliance with these practices.

Finally, while many reform proposals have been put forth to date, the details and the ultimate reform package have not yet been decided. Essential quantitative and qualitative analyses of the potential impacts of the proposed reforms, both individually and collectively, are ongoing. The goal will be to achieve a level of true reform in the financial sector that the crisis has revealed to be essential, while avoiding harmful effects and unintended consequences that could ultimately undermine the new measures.

(1) See Praet and Nguyen (2010) for a proposal regarding a European Resolution Authority.

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Measuring the systemic importance of financial institutions using market information

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Stijn Ferrari

Introduction

The recent crisis has shifted the focus from the assessment of the resilience of individual financial institutions towards a more systemic approach. Hence, it is expected that macro-prudential supervision and regulation will play a vital role in the new financial architecture. In particular, experts are advocating financial regulation focused on limiting systemic risk. As illustrated by the current crisis, an important aspect of systemic risk, which broadly speaking is the risk of a widespread crisis in the financial system, is the propagation of adverse shocks to a single institution through the rest of the system. Therefore, mitigating the risk stemming from so-called systemically important institutions, i.e. the financial institutions whose failure generates a large adverse impact on the financial system, has been identified as an important policy item. In particular, consideration is currently being given in a number of jurisdictions to the possibility of applying special policies, such as a tax or capital surcharge, to systemically important institutions. The purpose of this type of regulations would be to reduce the probability of failure of systemically important institutions and to mitigate the impact of their failure if that nevertheless occurred.

Yet, a crucial step in macro-prudential supervision and regulation aimed at reducing the risk of systemically important institutions is to identify which institutions are in fact systemically important. However, this is not a straightforward task, and the existing proposals on the matter still seem far from having developed the ideal measure of systemic importance.

The purpose of this article is to provide a conceptual discussion regarding the notion of systemic importance, to identify specific issues that need to be taken into consideration when designing a measure of systemic importance, and to review existing measures of systemic importance based on market information. Measures based on market information have recently attracted considerable attention, as they only require publicly available data that in many cases are quicker than the alternative approaches at detecting (changes in) systemic importance.

The absence of a solid conceptual background for measuring systemic importance hampers the design of proper measures of the systemic importance of financial institutions, and blurs the comparison of the various approaches suggested in the evolving literature in this field. In this context, we argue that, although systemic risk and systemic importance have some similarities, they are distinct concepts that differ in their defining aspects and drivers. In order to properly measure the systemic importance of a financial institution, the measure must concentrate on the institution's potential impact on the system in the event of failure or distress, which largely boils down to capturing the spillover or contagion effects from the institution in question to the rest of the system. This entails a major challenge, as spillover effects operate through several channels, both direct and indirect. In addition, determining systemic importance of a financial institution may entail separating spillover or contagion effects from the effects of a systematic shock through common exposures, as well as identifying cascade or domino effects. Our assessment of existing measures against this background

suggests that none of the proposed measures seems to actually succeed in precisely identifying the impact on the system of the failure or distress of an individual financial institution.

The remainder of the article is organized as follows. Section 1 presents a conceptual discussion on the notion of systemic importance and its main drivers. In this section, we also advance some specific identification issues that need to be taken into consideration when designing a measure of systemic importance. Section 2 discusses the use of market information for the measurement of systemic importance and presents the methodologies used in the construction of the existing measures of systemic importance based on market information. A critical assessment of these measures against the main issues identified in Section 1 will be presented in Section 3. Section 4 offers some concluding remarks.

1. The concept of systemic importance

In this section we define the concept of systemic importance and identify the main factors that affect an institution's systemic importance. These will determine which type of information a measure of systemic importance should contain, and to which factors or drivers it should respond. We first briefly discuss the definition and driving factors of the more general notion of systemic risk. The purpose is to highlight the differences between the concepts of systemic risk and systemic importance. In particular, we will argue that some of the factors that affect the level of systemic risk should not be reflected in the measure of an individual institution's systemic importance. Finally, we end this section by discussing some specific issues which concern identification of the impact of a financial institution's failure or distress.

1.1 Defining systemic importance

1.1.1 Systemic risk

Given the many systemic risk sources and channels, there is no generally accepted definition of systemic risk. In some cases, a description of the "phenomenon" of systemic risk and its different dimensions is given, rather than a succinct definition.[1] More concise definitions of systemic risk can be found in e.g. Acharya et al. (2009, p.283) and IMF/BIS/FSB (2009, p.2), who define systemic risk as *"the risk of a crisis in the financial sector and its spillovers to the economy at large"* or *"a risk of disruption to financial services that is (i) caused by an impairment of all or parts of the financial system and (ii) has the potential to have serious negative consequences for the real economy"*, respectively. Finally, more applied papers that attempt to measure the level of systemic risk generally narrow their focus on the vulnerabilities and effects within the financial sector itself, ignoring the potential spillovers to and from the real economy. In these papers, systemic risk refers to the risk of the simultaneous failure of a substantial number of financial institutions.[2]

1.1.2 Systemic importance

Like the concept of systemic risk, the definitions of a systemically important financial institution seem to differ in specific respects. The main differences again relate to the scope of the definition, i.e. whether the focus should only be on the financial system or on the real economy as well. For instance, whereas ECB (2006, p.132) in its discussion of large and complex banking groups refers to "*institutions whose size and nature of business is such that their failure and inability to operate would most likely spread and have adverse implications for the smooth functioning of financial markets or other financial institutions operating within the system*", IMF/BIS/FSB (2009, p.8) states that for assessing the systemic importance of financial institutions the main criteria relate to *"their potential to have a large negative impact on the financial system and the real economy"*. Similar definitions that also consider the impact on both the financial system and the real economy can be found in FSA (2009), Thomson (2009) and Zhou (2009). Finally, IMF/BIS/FSB (2009, p.5) notes that with respect to systemic importance *"some authorities focus on the impact on the* financial system*, while others consider the ultimate impact on the* real economy *as key"*.

Hence, in its narrowest sense, a financial institution can be considered to be systemically important if its failure or distress would have a significant adverse impact on the financial system. This impact will to a large extent result from spillover or contagion effects, which, as we discuss below, operate through many different channels. As a consequence, and owing to several other issues that will be identified in the remainder of this article, measuring the impact on the financial system of the failure or distress of a financial institution, and hence deciding on that institution's degree of systemic importance, is by no means a straightforward task.

(1) See e.g. ECB (2009) and IMF (2009).
(2) See e.g. Lehar (2005), Giesecke and Kim (2009), Huang, Zhou and Zhu (2009a,b), and Tarashev, Borio and Tsatsaronis (2009a,b).

1.2 Drivers of systemic importance

1.2.1 Drivers of systemic risk

In general, the level of systemic risk is determined by two general types of drivers: the default probabilities of the system's institutions, and the dependence or correlation of defaults of institutions in the system.

Individual default probabilities

The first driver of systemic risk is the level of individual risk facing the institutions in the system; the higher the probabilities of default of those individual institutions, the greater the risk of the simultaneous failure or distress of a substantial number of financial institutions, and hence, the higher the level of systemic risk.

Dependence of defaults

The dependence structure or correlation of the defaults of the different institutions in the system determines the degree of default clustering in the system, i.e. the probability that the failure of a substantial number of financial institutions occurs at the same time. This dependence structure is essentially determined by two underlying forces: common exposures and spillover channels.

Common exposures The degree of common exposures of financial institutions determines to what extent the institutions' asset portfolios are vulnerable to similar risk factors. When financial institutions are to a large extent exposed to common risk factors, a systematic shock may adversely affect many institutions at the same time and pose a potentially large threat to the stability of the financial system: thus, common exposures increase the risk of the simultaneous failure or distress of a substantial number of financial institutions, and therefore the level of systemic risk.

Spillover channels The second determinant of risk dependence in the system is the presence of spillover or contagion channels, through which (idiosyncratic) shocks may spread from one institution to the rest of the financial system. If shocks to an institution easily spill over to the other institutions in the system, this again raises the probability that a substantial number of financial institutions fails at the same time.

The literature has identified several direct and indirect channels through which spillover effects operate.[1] The most obvious spillover channels are direct exposures between financial institutions through the interbank money market and counterparty relations (e.g. derivative markets, payment systems). However, there are also indirect contagion channels, such as the adverse price effects on the asset portfolio of other financial institutions in the system in the case of asset fire sales by a particular institution in distress. In addition, owing to imperfect and asymmetric information, the failure of one institution may trigger contagious bank runs in retail and wholesale (e.g. interbank) markets. Finally, the failure or distress of a financial institution may lead to negative feedback loops between the financial sector and the real economy. Overall, these channels can be classified as specific elements of the general concept of "interconnectedness", both between financial institutions within the financial system and between the financial system and the real economy: i.e., spillover channels directly or indirectly interconnect the different financial institutions in the system (and the financial institutions with the real economy). Finally, note that these channels are not mutually exclusive and may co-exist.

1.2.2 Drivers of systemic importance

The importance of spillover effects in determining the impact of a financial institution on the system in the case of failure or distress implies that the presence of systemically important institutions increases the potential level of systemic risk. On the other hand, even in the absence of (individually) systemically important institutions, the level of systemic risk may be high; for instance, consider a financial system consisting of small and unconnected banks with a large degree of common exposures. In the following paragraphs, we discuss the extent to which the main drivers of systemic risk also apply as determinants of systemic importance. We also briefly discuss two additional factors that have been commonly identified as drivers of systemic importance: the institution's size and the substitutability of its activities.[2]

Individual default probabilities

In measuring the systemic importance of a financial institution, it is important to distinguish between the default probability of the institution in question, and the default probabilities of the other institutions in the system.

Default probability of the institution in question As systemic importance is determined by the impact on the system of a financial institution's failure or distress, and not by the probability of such an event occurring, the

(1) For a survey of the theoretical and empirical literature on systemic risk, see e.g. de Bandt and Hartmann (2000) and ECB (2009).

(2) See ECB (2006), FSA (2009), IMF/BIS/FSB (2009), and Thomson (2009). Other potential (indirect) factors identified in these works are for instance the institution's complexity and the type of assets it is holding.

default probability of the financial institution in question is a not a driver of systemic importance. In particular, a sound bank may also be systemically important.

Default probabilities of the other institutions in the system The above argument does not imply, however, that the default probabilities of the other institutions in the system may not affect the systemic importance of a particular financial institution. In particular, the potential impact of the failure or distress of a particular financial institution is likely to be larger in stress periods, when the default probabilities of the other institutions in the system are greater, than in normal times. For this reason, the assessment of systemic importance involves a major element of state dependency and time-variability.[1] As argued by FSA (2009), IMF/BIS/FSB (2009) and Thomson (2009), this may make it difficult for supervisors and regulators to determine a priori the degree of systemic importance of the financial institutions in the system. Note, however, that the poor financial health of the other institutions in the system would not be a sufficient condition per se for a large systemic impact in the case of the failure or distress of the institution in question; the idiosyncratic failure or distress of a small and unconnected institution should not necessarily have a large impact on the rest of the system, even in stress periods. Therefore, the default probabilities of the other institutions in the system are rather an indirect driver that may strengthen the effect of shocks that propagate through the system.

Dependence of defaults

Common exposures While the common exposure to a systematic shock affects the level of systemic risk, in that a systematic shock may adversely affect many institutions at the same time, the joint vulnerability to adverse systematic shocks is not a determinant of systemic importance. In particular, although a group of banks with an exposure to a common factor may be argued to be "systemically important as a herd", the idiosyncratic failure or distress of a small institution in this herd that is only correlated to the other institutions through their common exposures should not necessarily have a large impact on the rest of the system.

Common exposures may nevertheless be a driver of systemic importance, in that they may strengthen the degree to which idiosyncratic shocks propagate through the system, for instance through the asset fire sales channel. In particular, the greater the degree of commonality between the failing or distressed institution's assets and those of the rest of the system, the larger the potential adverse price impact of asset sales by the failing or distressed institution on the asset portfolio of the other institutions in the system. Hence, although common exposures as such are not a direct driver of an institution's systemic importance, this factor may, like the financial condition of the rest of the system, nevertheless play an indirect role in determining the strength of spillover channels.

Spillover channels Since systemic importance is defined as the potential impact of a financial institution on the system, the presence of spillover or contagion channels, or more generally the interconnectedness of the institutions in a financial system, is clearly a driver of systemic importance. As discussed in Section 1.2.1, there are many potential channels through which spillover effects operate, such as direct exposures between financial institutions through the interbank money market and counterparty relations in derivative markets or payment systems. Essentially, if there were no channels directly or indirectly interconnecting the various financial institutions in the system (and linking the financial institutions to the real economy), there would be no possibility for shocks to propagate through the system: that would therefore limit the degree to which institutions are likely to be systemically important.

Additional factors

Size The size of a financial institution can be intuitively expected to be an important determinant of its systemic importance; the larger an institution in terms of exposures, transaction volumes or the volume of assets managed, the larger the potential disruptions to the system in the case of failure or distress. The impact of size can be direct, in that the failure of a large player in the system potentially has a severe adverse impact on the functions performed by the system, or indirect, in that size increases a financial institution's impact through the various spillover channels identified in Section 1.2.1. In this context, it is not necessarily the financial institution's absolute size that matters; it is often the relative size in a market or product class that determines a financial institution's impact in the case of failure or distress. For instance, the failure of a smaller institution in terms of total assets may have a large impact if the institution has a dominant position in a key financial market.

Substitutability An additional determinant of a financial institution's systemic importance is the degree of substitutability of the institution's activities; the more difficult it is for other institutions in the system to provide the same or similar services, the less substitutable and therefore the

(1) This may also be the case, for example, simply because measures of interconnectedness can vary on a daily or even intradaily basis (FSA, 2009).

more important the institution may be. Examples of key services for which financial institutions may lack immediate substitutes are clearing and settlement and brokerage services. The potential costs from a lack of substitutability can be expressed in two dimensions: costs of delay and lower cost efficiency of performing the activities. First, it may be that other institutions are able to assume the failing or distressed financial institution's activities without additional cost, but there is a substantial delay in the continuation of the activities. This interruption of the activities performed by the failing financial institution may inflict large losses upon the system. Second, other institutions may be able to resume the failing or distressed financial institution's activities without delay, but at higher cost. This again increases the losses for participants in the system. Finally, these costs are likely to be much more of a concern when the services provided are large in volume, or where they provide a key link in connections among financial institutions (IMF/BIS/FSB, 2009).

1.3 Identification of systemic importance

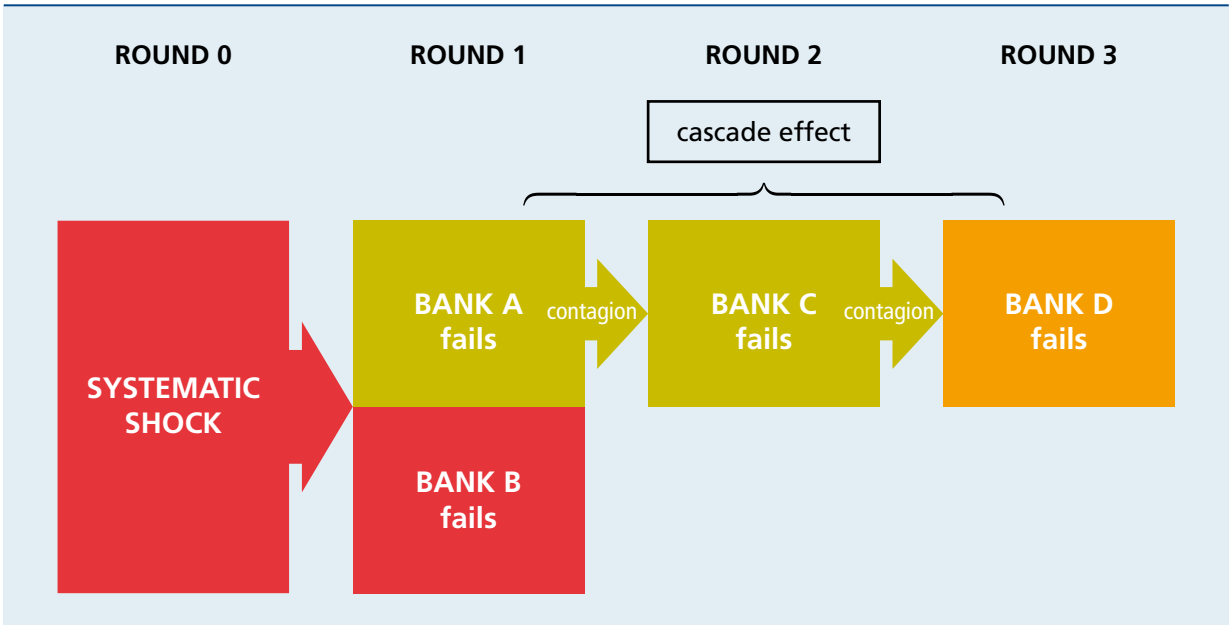
The above discussion indicates that a measure of a financial institution's systemic importance should capture the impact of the institution's failure or distress on the financial system. Consequently, the measure should intuitively depend on the drivers of systemic importance identified above, e.g. a financial institution that is highly interconnected with the rest of the system should be identified as systemically more important than an identical institution which is less interconnected with the other institutions in the system. However, we have also argued that while some factors, such as the default probability of the institution in question, may affect the level of systemic risk, they should not influence the measure of systemic importance of an individual financial institution. In the remainder of this section, we discuss some specific issues related to the identification of the impact of a financial institution's failure or distress that need to be taken into consideration when designing a measure of systemic importance.

We shall base our discussion on a hypothetical example, aiming to identify the systemic importance of Bank A. In particular, as depicted in Chart 1, suppose the financial system is hit by a systematic shock. In the first round, this systematic shock causes Bank A and Bank B to fail. The failure of Bank A in turn causes Bank C to fail. Finally, in the last round, the failure of Bank C causes Bank D to fail.

1.3.1 Spillover effects versus common exposure to systematic shocks

The first issue that arises in this context is that, in determining a financial institution's impact on the system in the case of failure or distress, it is important to separate spillover or contagion effects from the effects of a systematic shock through common exposures. That is, the failure of Bank B, which occurs simultaneously with that of Bank A, should not be considered as part of the impact of Bank A's failure. Ideally, the assessment of the impact of a financial institution's failure on the system would be based

CHART 1 ILLUSTRATION OF THE IDENTIFICATION ISSUES INVOLVED IN DETERMINING SYSTEMIC IMPORTANCE



on a failure of the institution caused by an idiosyncratic shock. The extent to which this idiosyncratic shock propagates through the system will determine the financial institution's impact, and hence its systemic importance. Evaluating a financial institution's impact on the system on the basis of its failure due to a systematic shock that has a simultaneous effect on a significant part of the system may substantially overestimate the institution's impact, if the direct impact of the systematic shock on institutions other than the financial institution in question is not separated from the indirect impact through spillovers from that institution to the other institutions in the system. In our example, if the failure of Bank B is considered to result from the failure of Bank A, Bank A's systemic importance will clearly be overestimated. The methodological corollary of this argument is that the measurement of a financial institution's systemic importance may entail the separate identification of spillover effects and common exposures as drivers of the dependence or correlation of the financial institutions' defaults.

1.3.2 Cascade or domino effects

The second identification issue relates to the identification of cascade or domino effects, where the failure of one financial institution causes the failure of other financial institutions in a first round, and these in turn cause the failure of several other institutions in a second round (and so on). In our example, the failure of Bank A causes Bank C to fail, which in turn causes Bank D to fail. In this case, the total impact of the failure of the first financial institution (Bank A) also depends on the impact that each of the other failing institutions have in the next rounds, i.e. the impact of Bank C on Bank D. This raises the question as to whether only the first-round effects or the effects of all rounds should be taken into account when assessing the degree of systemic importance for the purpose of applying a special policy such as a tax or capital surcharge on systemically important institutions.

2. Measuring systemic importance using market information

In this section we provide an overview of the methodologies used in the existing measures of systemic importance based on market information. First, however, we briefly discuss the motivation for using market information for the measurement of systemic importance.

(1) See ECB (2006), IMF/BIS/FSB (2009), and Thomson (2009).
(2) See e.g. Wells (2002) for the UK, Furfine (2003) for the US, Upper and Worms (2004) for Germany, and Nguyen and Degryse (2007) for Belgium. For a more complete list of applications for different countries, see IMF (2009).
(3) See Praet (2010).

2.1 Motivation for using market information-based approaches

As already noted above, given the many different channels through which spillover or contagion effects operate, measuring a financial institution's degree of systemic importance is not a straightforward task. In general, one can distinguish three broad approaches among the existing techniques: the indicator-based approach, the network approach, and the market information-based approaches.

Indicator-based and network approaches

Indicator-based approach This approach consists of aggregating several quantitative indicators to produce a measure of systemic importance.[1] These indicators proxy for different factors that could render a financial institution critical for the stability of the system, i.e. the drivers of systemic importance identified in the previous section. Some indicators that have been proposed in the literature include, for instance, total assets (to proxy for size), total interbank liabilities and assets (to proxy for interconnectedness) and the share of non-traditional banking activities (to proxy for substitutability). Each institution receives a score for each indicator, after which an aggregation technique is applied to produce a single synthetic measure of its systemic importance.

Network approach A second approach taken to measure systemic importance makes use of network theory to map the interconnections or interlinkages between the financial institutions.[2] This requires *inter alia* data on interbank loans, including cross-border exposures, as well as information on credit risk transfer instruments. Once these interlinkages are properly established, simulations of shocks to specific institutions allow tracking of the cascade or domino effects on other institutions in the network. The strength of such cascade or domino effects can be used to determine the systemic importance of a particular institution.

Not only are the data requirements for the above two approaches quite substantial, the data needed for this type of analysis are often not (publicly) available. Although there are currently initiatives under way that aim at satisfying some of the substantial data demands for assessing the systemic importance of financial institutions[3], considerable data gaps exist and will probably persist in the future. This is especially true for the interconnections among financial institutions, which are one of the main drivers of systemic importance. In addition, the two approaches discussed above have some serious shortcomings. For instance, it is not clear what weight to

place on the various indicators in the aggregation of the individual indicator scores in the indicator approach. In addition, the aggregation of scores on separate indicators is unlikely to take sufficient account of the interactions between the various drivers of systemic importance. As for the network approach, an important criticism is that the financial institutions' behaviour in reaction to the failure of another institution in the system is not taken into account.

Market information-based approaches

Given the substantial data requirements and the shortcomings of the indicator and network approaches, techniques using market information have recently received considerable attention. In general, the only inputs required in these approaches are market prices (e.g. CDS, equity) for the financial institutions in the system, possibly combined with the financial institutions' balance sheet information. Therefore, the main advantage of market information-based approaches compared to alternative approaches is the public availability of the data. As this is true for many geographical areas, it allows consistent assessment of systemic importance for financial institutions located in different countries and banking systems. In addition, market data are available at a high frequency (at least daily) and are forward-looking, implying that in many cases (changes in) systemic importance can be detected in a more timely manner than in the alternative approaches.

Obviously, approaches based on market information also have their shortcomings. A first disadvantage of using market information is that market prices are only available for listed firms. This may mean that not all potentially relevant institutions in the system can be taken into account in the assessment of systemic importance. A second shortcoming relates to the information content of market prices. First, the underlying assumption when using market information for risk assessment is that markets are efficient. Furthermore, even if markets are informationally efficient, all relevant private information may not be reflected in the prices. Second, movements in both equity and CDS prices may be driven by factors unrelated to credit risk, such as changes in the liquidity premium or investor risk aversion. [1] In addition, in periods of crisis, the information content of market prices may be affected by public intervention, for example.

Despite these shortcomings, the public and timely availability and the forward-looking nature of the data used in these market information-based approaches may make them potentially useful for macro-prudential policy and regulation, at least as complements for the systemic importance measures produced by the other approaches.

2.2 Overview of methodologies used in market-based measures of systemic importance

The systemic importance of a financial institution is determined by some measure of the impact of the institution on the financial system. [2] In this subsection we offer an overview of the techniques used to construct market information-based measures of systemic importance, developed both before and during the current financial crisis.

In general, one can distinguish between measures that assess the impact of the failure or distress of a particular institution in terms of the likelihood of spillover effects, and measures that assess the severity of the losses

(1) See e.g. Annaert et al. (2010).

(2) This definition of systemic importance, which only considers the effects across financial institutions and disregards any effects on the real economy, is the one usually adopted in the applications which measure systemic importance using market information.

TABLE 1 CLASSIFICATION OF METHODS TO ASSESS SYSTEMIC IMPORTANCE USING MARKET INFORMATION

Method	Approach	Basic assessment	Applications
Co-risk approach	infer the impact of the failure or distress of a financial institution directly from market data	robust because of minimal assumptions, but the scale of the systemic importance measure is hard to interpret	Adrian and Brunnermeier (2009), IMF (2009)
Portfolio approach	first quantify total risk in the system, then determine the contribution of each individual institution to system-wide risk	efficient way to condense the information on losses of all individual institutions into losses of the entire system, the systemic importance measure has interpretable scale, but strong assumptions	Elsinger, Lehar and Summer (2006a), Huang, Zhou and Zhu (2009b), Tarashev, Borio and Tsatsaronis (2009a,b), Gauthier, Lehar and Souissi (2010)

associated with the failure or distress of the institution. Applications of the former class of measures generally consider the probability of the failure or distress of a number of institutions in the system conditional on the failure of another institution.[1]

In this article we focus on measures that capture the severity of losses.[2] In particular, we distinguish between (i) methods that infer the impact of the failure or distress of a financial institution directly from market data, without any need to quantify the overall risk in the system in advance, and (ii) methods that first quantify the overall risk in the system and then determine the contribution of each individual institution to system-wide risk to determine systemic importance. We label the first type of method as the co-risk approach, and refer to the second type as the portfolio approach. Table 1 provides an overview of this classification.

2.2.1 The co-risk approach

Co-risk measures of systemic importance generally infer the impact of the failure or distress of a financial institution directly from market data, such as stock returns or CDS spreads, without relying on a structural credit risk model to first quantify total risk in the system. The advantage of these approaches is therefore that they require little information and make use of statistical methods with minimal assumptions, to obtain an estimate of a financial institution's potential impact on the system.

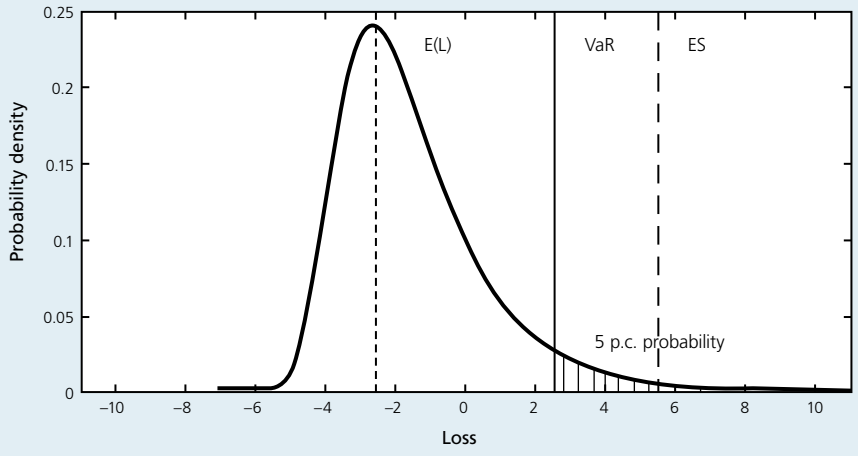
(1) See e.g. Hartmann, Straetmans and de Vries (2005), Geluk, Haan and de Vries (2007), Segoviano and Goodhart (2009), and Zhou (2009).

(2) As discussed by Zhou (2009), likelihood-based measures of systemic importance may not provide sufficient information on the systemic importance of a financial institution.

Box 5 – Value-at-risk and expected shortfall

The most commonly used risk measures are those that focus on extreme losses (i.e. the tail of the distribution): value-at-risk (VaR) and expected shortfall (ES).

The chart below illustrates the concepts of VaR and ES. The chart shows the probability density of a loss distribution L of a hypothetical financial institution.[1] In addition, the chart contains a series of vertical lines, indicating the mean loss ($E(L)$), and the 95 p.c. VaR ($VaR_{95\%}$) and ES ($ES_{95\%}$), respectively. Note that since the chart depicts a



Source: McNeil, Frey and Embrechts (2005).

(1) VaR and ES can also be derived for distributions other than loss distributions, e.g. the distribution of stock returns or CDS spreads.

loss distribution, negative losses imply positive profits; as $E(L) = -2.5 < 0$, the financial institution is on average expected to make a positive profit. In addition, the loss distribution is asymmetric (skewed to the left); therefore, even though the institution on average makes a positive profit, the probability of extreme losses for the financial institution is larger than the probability that extremely large profits will be realised.

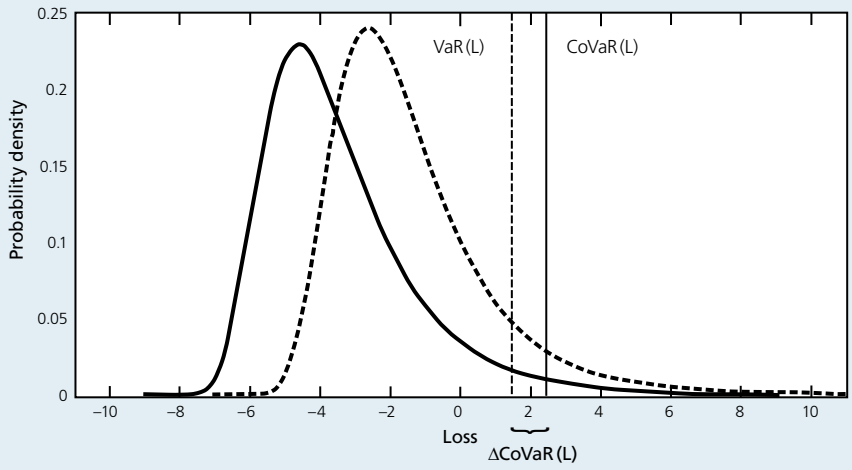
The chart shows that the $VaR_{95\%}$ is approximately 2.5, indicating that there is a 5 p.c. probability that the losses of the financial institution amount to at least this figure for a given time horizon.

Expected shortfall is an alternative risk measure that considers additional information from the tail of the loss distribution, beyond the threshold value considered exclusively by the VaR risk measure (as indicated by the shaded area in the chart). The idea behind ES is to obtain a weighted average of all values above VaR, i.e. the average loss level above the $VaR_{95\%}$-level of 2.5 and thus to obtain an average value for the tail of the distribution of the losses. In the chart above, $ES_{95\%}$ is approximately 5.5.

Intuitively, co-risk measures determine the systemic importance of a financial institution as the increase in the risk of the financial system when the institution in question encounters distress. Perhaps the best known co-risk measure of systemic importance is ΔCoVaR proposed by Adrian and Brunnermeier (2009). The calculation of ΔCoVaR makes use of the risk measure value-at-risk (VaR, see Box 1 for an illustration) and involves two main steps. First, the (unconditional) VaR from the distribution of, for instance, stock returns for the index of financial institutions (the system) is computed. This represents a VaR for the financial system. Second, the conditional VaR (CoVaR) is computed as the VaR for the distribution of the stock returns of the index of financial institutions, conditional on the stock return of the financial institution in question being at its VaR-level (in distress). The difference between CoVaR and the unconditional VaR of the system is called ΔCoVaR, which is the eventual measure of systemic importance.

Chart 2 illustrates the use of ΔCoVaR to measure systemic importance. The numerical example is based on hypothetical stock returns for the index of financial institutions in the system, whose probability distribution L is plotted as the solid line in the chart. Similarly, it is possible to obtain a probability distribution of the stock return of the system, conditional on the institution in question being in distress (the dashed line). Therefore, the impact of the failure or

CHART 2 ILLUSTRATION OF ΔCoVaR



distress of the institution on the system, i.e. its systemic importance, could be obtained from the difference in the VaR for the conditional and the unconditional stock return distribution. In Chart 2, the $VaR_{95\%}(L)$of the system is approximately 1.5, and the $CoVaR_{95\%}(L)$ of the system (i.e. the VaR of the system conditional on the financial institution in question being in distress) is approximately 2.5; then, the increase in the risk of the financial system when the institution encounters distress (ΔCoVaR) is 1.

Since co-risk measures are pairwise measures, they may also be used to measure the impact of a financial institution on each of the other individual institutions in the system, rather than on the entire system at once. IMF (2009) considers a mapping of all pairwise co-risk measures across a number of institutions in the financial system.[1] One way to obtain from this mapping an indication of the overall systemic importance of a financial institution may be to look at the average impact of the institution on all of the other institutions.

While co-risk measures may provide an assessment of the systemically important institutions with only minimal distributional assumptions and no need to first quantify overall risk, these approaches have important drawbacks as well. One drawback is the interpretability of the scale of the measure of systemic importance. Thus, there seems to be no obvious answer to the following question: when is the impact of a financial institution on the system (or on another institution) large enough for the institution to be considered as systemically important? The challenge is to determine a cut-off value that provides a clear and transparent method of ranking institutions according to their systemic importance.

2.2.2 The portfolio approach

In general, measuring the systemic importance of each of the institutions in the financial system via the portfolio approach involves two steps: (i) quantification of the overall risks in the system; and (ii) determining the contribution of each individual institution to system-wide risk. Since the overall loss in the system provides a maximum scale as a benchmark for the individual institutions' contributions to total losses, the interpretability of the scale of the measure of systemic importance is not an issue, and individual institutions can easily be ranked. We now discuss the two steps of the portfolio approach in more detail.

(1) Rather than using ΔCoVaR, which is the difference between the conditional and the unconditional VaR, IMF (2009) considers a relative co-risk measure: the ratio of the conditional VaR (CoVaR) over the unconditional VaR, minus 1 (times 100).

Step 1: Quantification of systemic risk

Perhaps the most widely used technique for quantifying the overall risks in the system has its origins in Merton's firm value model or contingent claims analysis. Merton's model is an essential starting point for modelling credit risk of an individual firm. In this model, the value of the firm's equity at some point in time is equal to the payoff of a European call option on the asset value. This means that a firm's probability of default essentially depends on three parameters: the firm's leverage, and the volatility and mean return of the asset value process. Multivariate extensions of Merton's model are of general use for modelling the default risk of a portfolio of firms; these are the so-called structural models of portfolio credit risk. In the context of measuring systemic risk, the relevant portfolio is that of the financial institutions that make up the financial system.

To quantify systemic risk, an aggregate loss distribution is derived from the individual losses of each institution, under assumptions regarding the likelihood of default (PDs) and severity of losses (LGDs), together with an assumed dependence structure across the institutions. The aggregate loss distribution represents the distribution of total losses of the financial system. A measure of portfolio risk, or in this case system-wide risk, will be a function of the estimated aggregate (portfolio) loss distribution. The most commonly used risk measures are those that focus on extreme losses (i.e. the tail of the distribution): value-at-risk (VaR) and expected shortfall (ES). Box 1 discusses these risk measures, which are used to quantify systemic risk.

The main advantage of the portfolio approach is its ability to condense the information on losses of all individual institutions into losses of the entire system in an efficient manner. However, this efficiency comes at a price of imposing strong assumptions, such as distributional assumptions and assumptions regarding portfolio diversification and default correlations. As a consequence, a substantial degree of model risk is embodied in the analysis; small changes in the assumptions may alter not only the estimated level of systemic risk, but also the set of institutions that are identified as systemically important.

Step 2: Allocation of systemic risk

Once systemic risk is quantified, the contribution of each financial institution can be determined. This contribution will be the eventual measure of the institution's systemic importance. Thus, in the portfolio framework, determining the systemic importance of a given financial institution boils down to a problem of allocation among

the institutions of the system: many allocation schemes are available for that purpose. In particular, allocation schemes can be divided into mechanisms based on discrete contributions, partial contributions, the Shapley value, and the continuous marginal allocation.[1] In the following paragraphs, we provide an intuitive description of these allocation schemes.[2]

Discrete contribution Intuitively, the discrete contribution method considers the difference between a risk measure based on the loss distribution of the entire system and a risk measure based on the loss distribution of the system excluding the institution in question. This difference between the evaluated risk functions indicates the systemic importance of the institution. An example of a discrete allocation method is incremental VaR (*iVaR*). For *iVaR*, first, the VaR of the loss distribution derived for the entire financial system is computed. Second, VaR is computed for the loss distribution derived for the system consisting of all institutions except the institution in question. The difference between both VaR-measures is the incremental VaR. Applications of incremental VaR can be found in Elsinger, Lehar and Summer (2006a) and Gauthier, Lehar and Souissi (2010).

Partial contribution This class of allocation mechanisms is very similar to the discrete contribution method. The partial distribution approach focuses on the difference between a risk measure based on the loss distribution of the entire system (as in the discrete distribution) and a risk measure based on the loss distribution of the entire system conditional on the institution in question being in distress. In the case of the partial contribution method, systemic importance is measured as the difference between an unconditional and a conditional loss distribution, where in the latter case the financial institution in question is at some particular risk (distress) level. An example of a partial allocation method is ΔCoVaR (see Section 2.2.1 for a graphical illustration of ΔCoVaR in the context of co-risk measures). We refer to Elsinger, Lehar and Summer (2006a) that introduce conditional expected shortfall as a measure of systemic importance, and Gauthier, Lehar and Souissi (2010) for an application of ΔCoVaR in the portfolio approach.

Shapley value Neither the discrete contribution method nor the partial contribution method is "additive", i.e. the sum of the risk contributions (the indicators of systemic importance of each institution) will not add up to the overall risk of the portfolio (systemic risk) for these methods. An approach that does possess the additivity property is the Shapley value, which represents an average of the institution's discrete contributions to the risk of each possible subportfolio (or "coalition") that includes this institution. The use of the Shapley value for determining the systemic importance of financial institutions was introduced by Tarashev, Borio and Tsatsaronis (2009a,b), and applied in a real data setting covering six Canadian banks by Gauthier, Lehar and Souissi (2010).

Continuous marginal allocation The final class of allocation methods is the continuous marginal allocation. Unlike the three previous methods that calculate contributions or allocations based on large changes in the portfolio, i.e. either dropping the institution in question from (a subset of) the portfolio (*iVaR*, Shapley) or conditioning on the distress of this institution (ΔCoVaR), the continuous marginal allocation method measures the change in the risk measure of the portfolio due to a small change in the portfolio composition. Intuitively, systemic importance based on the continuous marginal allocation method equals the VaR of the loss distribution of the entire system and the VaR of the loss distribution of the system with the portfolio weight of the institution in question changed by only a marginal amount. Like the Shapley value, this approach is additive, so the systemic importance indicators of the financial institutions in the system sum up to the total level of systemic risk. An application of a continuous marginal allocation method in the context of measuring systemic importance can be found in Huang, Zhou and Zhu (2009b).

3. Assessment of existing market-based measures of systemic importance

In this section we present an assessment of the existing techniques in light of the main issues identified in Section 1. We first check whether the proposed measures of systemic importance are designed so as to capture the impact on the financial system of the failure or distress of a financial institution. Second, we assess to what extent the measures actually succeed in measuring the impact of an institution's failure. The aim is not to offer an exhaustive overview of all the properties of the existing measures, but rather to signal some potential weaknesses of different techniques.

Measuring impact rather than fragility

Given the lack of conceptual agreement on systemic risk and systemic importance pointed out in Section 1, it is not uncommon to find that some approaches claiming to

(1) See e.g. Tasche (2000) and Koyluoglu and Stoker (2002) for a formal definition of the allocation schemes.

(2) Note that the allocation schemes could, in principle, also be applied to directly infer systemic importance from market data. This is for example the case for ΔCoVaR, that has been applied both as a co-risk measure and as an allocation scheme in the portfolio approach.

measure systemic importance may actually be measuring a different, but slightly related concept, such as the systemic fragility of a financial institution. Systemic fragility is defined as the impact on some financial institution *i*, measured conditional on the distress of the system. One might argue that systemic fragility is the opposite of systemic importance. (1)

The distinction between measures of systemic importance and systemic fragility is rather obvious for approaches that are based on conditional events. For example, partial contribution methods and co-risk measures, such as ΔCoVaR, which considers the change in the risk of the system due to the distress of one institution, are clearly measures of systemic importance. (2) The distinction, however, may be less clear for the allocation methods (other than the partial contribution) that are used to determine systemic importance in the portfolio approach. As a result, even though some authors argue that they are measuring systemic importance, they are actually measuring systemic fragility. For instance, (continuous) marginal risk contributions may result in a measure of systemic importance consisting of the losses of the institution in question in the case of the financial system being in distress. Clearly, this is a measure of systemic fragility : i.e., the extent to which the institution in question is impacted in the case the system is in distress, rather than a measure of the institution's impact on the financial system.

Identification of impact

As discussed in Section 1.3, there are two issues in identifying the impact of the failure or distress of a financial institution. First, in determining a financial institution's impact on the system in case of failure or distress, it is important to separate spillover or contagion effects due to the institution's failure from the effects of a systematic shock through common exposures, which may cause simultaneous failures of this institution and others. Second, the methodology to determine systemic importance should allow the identification of cascade or domino effects and take these into account in the assessment of systemic impact.

Spillover effects versus common exposure to systematic shocks Co-risk measures provide enough flexibility so as to properly account for common risk exposures and therefore separate the direct effect of the institution on the system from the correlation in failures stemming from common exposures.

In contrast, the existing measures of systemic importance based on the portfolio approach do not disentangle the common exposure component from the spillover channel component in the institutions' dependence structure. In the portfolio approach, the model design often includes some form of factor structure that determines the dependence between the asset values of the financial institutions, and accounts for the common exposure in the portfolio of financial firms.

Overall, the measurement of systemic importance of the financial institutions calls for the separate identification of the contagion effects and common exposure as drivers of the dependence in the individual institution's risk levels. The importance of properly identifying these two sources of default clustering is an issue that has started to receive attention in the credit risk literature ; hopefully it will soon be introduced in the portfolio-based methodologies that measure systemic importance. (3) The evolving methodologies may indeed profit from the literature on measuring contagion effects, which was primarily developed to analyse international stock market co-movement in the late nineties (1994 Mexican peso crisis, 1997 east Asian crisis). (4) Such literature provides a way to test for the existence of contagion effects and simultaneously account for common exposures. However, the downside is that the application of the test is on observed episodes of distress ; such an *ex-post* approach can render the methodology less useful for macro-prudential purposes.

Cascade or domino effects A second issue is that the methodology to determine systemic importance should allow taking cascade or domino effects into account in the assessment of systemic impact. However, none of the currently proposed applications based on market information is able to take this issue into account. For example, ΔCoVaR measures the total impact of a particular institution on the system ; no distinction is made between whether this impact is entirely the direct consequence of the institution's failure or the result of a sequence of failures in a cascade or domino chain. The same is true for the applications of the portfolio approach. Perhaps the most appropriate platform to capture cascade or domino effects is a network-based approach, as briefly discussed in Section 2.1. Along these lines, a series of papers by Alfred Lehar and co-authors introduce a hybrid model that combines the portfolio approach with a network model. (5) That is, their model consists of two components : a multivariate version of Merton's model, and a network model for interbank obligations. This second component

(1) If we denote systemic importance as the impact on the system measured conditional on the distress of some financial institution *i* ; then fragility is the impact on some financial institution *i* measured conditional on the distress of the system.

(2) The difference between measures of systemic importance and systemic fragility is also straightforward for the class of likelihood-based approaches.

(3) See e.g. Azizpour and Giesecke (2008), Giesecke and Kim (2009) and Lando and Nielsen (2009).

(4) See e.g. Claessens and Forbes (2001).

(5) See e.g. Elsinger, Lehar and Summer (2006b), and Gauthier, Lehar and Souissi (2010).

is able to capture two important factors of contagion: spillover effects and feedback loops. The authors stress the importance of mapping the exposures across institutions in order to fully capture the individual institution's risk and it implications on the system.

Concluding remarks

This article examines the conceptual background relating to measuring the systemic importance of financial institutions. First, although systemic risk and systemic importance have some similarities, they are distinct concepts that differ in their defining aspects and drivers. Second, in order to properly measure the systemic importance of a financial institution, the measure must concentrate on the institution's potential impact on the system in the event of failure or distress, which largely boils down to capturing the spillover or contagion effects from the institution in question to the rest of the system. This entails a major challenge, as spillover effects operate through several channels, both direct and indirect.

In addition, the design of systemic importance measures raises several methodological challenges. One of these is the need to identify contagion or spillover effects due to an institution's failure separately from common exposure effects which can cause the simultaneous failures of several institutions. These challenges, together with state variability and time dependence of systemic importance, are critical, in that they render the a-priori assessment of systemic importance a difficult task. As a consequence, it may be desirable to evaluate the impact of a financial institution's failure or distress in some type of through-the-cycle or stress-testing framework, where other institutions' default probabilities and the dependence of institutions' defaults are evaluated at stressed levels. This might imply removing the time variation of systemic importance and only considering the worst case scenario.

Ultimately, however, the choice of assessment methodology is likely to depend on the possible policy applications. For example, macro-prudential policy aimed at the internalization of the costs imposed on others by the failure of systemically important institutions requires a different measure than macro-prudential policy with the purpose of institutions paying an insurance premium to cover their own losses in the case of a systemic event; whereas in the first case, a measure of systemic importance is required to determine the individual institutions' contributions, in the second case, the appropriate measure would be one of systemic fragility. However, referring to this measure of systemic fragility as a measure of systemic importance would be a misnomer. It is exactly the existence of this type of misnomers and the lack of a solid conceptual background that clearly defines systemic importance and how it differs from the concept of systemic risk that may generate confusion among market participants and supervisors when discussing and comparing macro-prudential policy tools.

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The banking market (jigsaw) puzzle : Would coming closer to a stand-alone subsidiary model automatically lead to cross-border re-fragmentation ?

Gregory Nguyen

Introduction

Over the two last decades, banking markets throughout the world have gone through a period of profound changes, marked by the emergence of some large cross-border financial institutions. This trend was even more important in Europe where it was supported by a strong desire to unify fragmented national markets and to reinforce the cohesion between European countries. The integration of financial and banking markets in Europe spearheaded economic integration, and many believed it to be a strong, necessary, and inescapable trend with many positive consequences, both for the financial industry, but also, more generally, for European countries and eventually for European citizens. The perceived advantages included benefits such as increased market liquidity, a reduction in transaction costs, more efficient transfers of funds from countries with excess savings to locations in needs of capital, accelerated transfer of financial technology, or a levelling of the European playing field.

The integration of financial and banking markets was supported, at the highest level, by changes in the legal, regulatory and economic environment : the launch of a common currency in the euro-zone countries, the introduction of the first and second banking directives – which included important breakthroughs such as the single banking licence, the home country control principle and the mutual recognition principle – and the harmonisation of financial laws through the Financial Services Action Plan (FSAP). The ultimate objective of financial market integration was to develop a single market where geographic location or nationality would become irrelevant in financial and banking operations.

However, this objective may not have been fully attained and, as a consequence, market integration in Europe might be less deep-seated than initially believed. Financial market integration proceeded smoothly in the early years of the single market, even though the level of integration varied in the different segments of the financial market (see e.g. Baele et al., 2004). Yet, following the financial crisis, the process might now appear to be reversible. The latest studies on financial market integration (ECB, 2009 and 2010) confirm that integration of financial markets, and in particular of money markets, suffered from the recent crisis. The negative impact might vanish over time, as markets normalise, but it nevertheless led to worries in the financial industry. As a consequence, prominent bankers have recently expressed their concerns on re-fragmentation (see e.g. Ackermann, 2009a and 2009b, Banzinger 2009 and IIF 2009a and 2009b).

The risk of cross-border re-fragmentation can be defined as the risk of segmentation, along national lines, of hitherto integrated financial markets or financial institutions, as a side effect of an adaptive process by market participants or new regulatory developments. This definition contains two main elements. First, it establishes a distinction between the fragmentation of financial markets and the fragmentation of cross-border financial institutions, which are two different concepts. Indeed, as

will be argued in this article, the fact that the operations of a cross-border bank become somewhat less integrated would not necessarily endanger market integration. Similarly, the fact that a banking group is integrated and operates in different jurisdictions does not necessarily mean that these jurisdictions form an integrated market. For instance, a group may determine its liquidity policy at a central level and allow flows between entities operating in different regions that are not really integrated (e.g. Europe and Asia). Secondly, the definition identifies two different sources of fragmentation risk. It may result from changes in financial institutions' behaviour: for instance, banks that have incurred major losses following their expansion on foreign markets may retreat to their home market (see e.g. Hakkarainen, 2009). Alternatively, re-fragmentation may also arise from new developments in the regulatory environment.

The financial industry has in fact identified various sources of re-fragmentation linked to the regulatory framework (see IIF, 2009a), which can be broken down into three different categories. First, the financial industry argues that national authorities' *interventions to resolve the crisis* have planted the seeds of future re-fragmentation. Indeed, national authorities have, in some cases, accompanied their rescue measures with strict conditions or repeated demands forcing rescued institutions to lend to their domestic economy.[1] Similarly, host authorities may have taken measures to protect domestic entities during the crisis and ring-fence their assets. Second, according to the financial industry, the *re-regulation* trend following the crisis, if *uncoordinated*, could become a source of fragmentation risk. Differences in national regulatory frameworks may increase the legal and compliance costs associated with international activities, counter-balancing all the synergies arising from cross-border integration. Yet, although their intensity may vary over time, national discrepancies in regulatory frameworks have always existed and have not, in recent years, stopped the globalisation of financial markets. In addition, several coordination bodies have been set up in the past – including the G20, the Financial Stability Board, the Basel Committee, and, at the European level, the European Institutions – and each of them is currently examining, within the limits of its mandate, how to promote an increased convergence of regulatory frameworks. The third source of re-fragmentation identified by the financial industry relates to the so-called *stand-alone subsidiary model*. As will be explained in the article, the stand-alone subsidiary model refers to a set of measures, partly described in section 1, such as e.g. local liquidity requirements, or limits on intra-group exposures. The designation of the model may, however be misleading, as in many case, these measures do not aim at imposing the corner situation in which subsidiaries are truly stand-alone entities. Rather, their objective is to decrease risks taken locally and at the same time ensure that crises affecting local entities are manageable at a local level, i.e. where crisis management responsibilities lie.[2]

Given that the first category of sources of fragmentation (i.e. crisis resolution measures) is linked to the crisis and is consequently temporary by nature, and given that the second category (i.e. non-coordination of measures taken by national authorities) is not a new development, the rest of the article focuses on the stand-alone subsidiary model. These measures are also the most important ones as they may reflect a durable change in authorities' expectations and, as a consequence, might imply a paradigm shift in the way regulatory frameworks are devised. The objective of this article is to examine whether stand-alone measures could possibly threaten market integration.

The impact of these expected regulatory changes on integration in normal times is not necessarily obvious as many different dimensions interact. Here again, there is a need to distinguish between integration of financial markets and integration of financial institutions. The degree of integration of a banking group is not a binary variable; rather, it evolves along a continuum (see also section 1). Therefore, measures reducing group interdependence do not necessarily imply the "dis-integration" of a group. In fact, there may be just a small move along this continuum, with no impact on market integration. Actually, financial market integration will only be at risk if costs associated with these measures are excessively high and if, in addition, banks cannot reduce the cost associated with these measures by adapting their behaviour in a way that satisfies supervisors.[3] The idea behind the model is, however, that limited private costs in normal times should be compensated by a decrease in the public costs associated with crisis management. Supervisors therefore have to find the delicate balance between measures that decrease the risk for their local financial system and measures that would threaten future integration of banking markets.

(1) See e.g. the French rescue plan that was accompanied with clear wishes as to the financing of households, SMEs and large firms and local authorities (see e.g. Intervention du Président de la République, à l'issue du Conseil des Ministres, Paris, le 13 octobre 2008). Similarly, UK Prime Minister Gordon Brown said, when the second UK rescue plan was launched: "These are comprehensive measures focused on one purpose: increasing the amount of lending that is available to families and to the businesses who are the backbone of our country and who want to invest and create jobs". (See e.g. "U.K. unveils second bank rescue plan", CNNMoney.com – 19 January 2009).

(2) This would also imply, as a corollary, that some groups would no longer be too big to fail, as each legal entity belonging to a group could be dealt with at a local level. Admittedly, however, the failure of some of these entities may still raise financial stability concerns.

(3) For instance, an entity lending funds to its group may be constrained by limits on large intra-group exposures. Instead of transferring funds to another entity that uses them to finance loans, the entity could directly finance part of these loans. As a consequence, the entity's exposure would become more diversified. This would reassure the local supervisor and at the same time render the constraint less binding.

The article is organised as follows. Section 1 describes the stand-alone subsidiary model. Section 2 discusses the link between stand-alone measures and the legal form of incorporation. In fact, measures imposing stand-alone subsidiaries may imply a higher risk of fragmentation if cross-border institutions are no longer able to operate as a group. However, a branch structure may constitute an alternative model to preserve banks' integration. It is therefore crucial, in this context, to understand what drives the choice of a given legal structure. Section 3 tries to assess the impact that the generalised use of the stand-alone subsidiary model would have, both on financial stability and on banking sector efficiency. Section 4 raises the issue of the tension between market integration and the European framework for crisis management, which is still based largely on national powers. It is this tension that creates incentives for national authorities to adopt measured based on territoriality. Therefore, this tension may need to be resolved if the risk of fragmentation is considered real and significant. That is why the section discusses elements of the European framework that, if addressed, could help to reduce these incentives. Finally, section 5 concludes.

1. The stand-alone subsidiary model

Sub-section 1.1. clarifies what exactly is meant by the stand-alone subsidiary model, while sub-section 1.2. provides examples of rules that come under that model.

1.1 Description

The stand alone-subsidiary model, despite its designation, is not really a model. Actually, it refers to a set of rules – which do not necessarily need to be introduced simultaneously – that share the same objectives, i.e. to facilitate crisis resolution by local authorities and make sure that, despite the level of integration of a banking group, the survival of its local entities does not depend entirely on the strength of the group. These measures thus try to ease the tension between the cross-border model of banks on the one hand, and the national allocation of crisis management responsibilities on the other (or as Mervyn King said, the fact is that "banks are global in life but national in death").

In order to facilitate crisis management at a local level, so-called stand-alone measures seek to work along three main lines:

– First they try to reduce the *complexity* of large cross-border financial institutions. This complexity results from the fact that large banking groups often combine different activities with varying risk levels and different stakeholders. The interactions between these activities and their geographic dispersion make crisis management tremendously complicated. In addition, the complexity increases when resources and infrastructure are shared by several entities across borders. The set of rules laid down to reduce complexity may therefore comprise rules to ensure that the subsidiary has the operational capabilities, the expertise, the IT systems and the infrastructure necessary to function autonomously. (1)
– Second, the stand-alone measures try to *strengthen domestic entities* both in normal times and in a crisis. They may comprise limits on risks taken locally, to make sure that the subsidiary's capital and liquidity are sufficient to sustain its local operations. These measures are based on a bottom-up approach, which assumes that strengthening each legal entity helps to increase the resilience of a group as a whole. In addition, measures may include ways to protect the assets of the subsidiary in times of crisis (ring-fencing).
– Third, they attempt to *decrease the interdependence* between an entity and its group. This may imply limiting the exposure of an entity towards its group (i.e. flows to the group), but also limiting its dependence on the group (i.e. flows from the group).

Do these measures reduce the integration of banking groups? Actually, the level of operational integration of a group could be presented along a continuum. For instance, some groups already operate with quasi stand-alone subsidiaries while others are much more integrated. Several models exist along this continuum, which can be stylised as follows (2):

– a low level of integration where the group entities only share *best practices* in terms of governance and *banking technology*. The entities could be disconnected with, in most cases, limited difficulties.
– a moderate level of integration where the group's entities share *infrastructure,* such as IT infrastructure, or *resources,* such as legal or human resources departments. In this case, separating the entities requires the negotiation of service level agreements to ensure that the provision of the services is not discontinued, at least in a transitional phase.
– a medium level of integration where the *brand* is also shared. Separation is less easily arranged because it requires a rebranding of some of the entities.
– a high level of integration where in addition, *key functions* such as liquidity and risk management are centralised. In addition, internal markets, based on

(1) Note that this does not necessarily imply duplication of these functions, as other arrangements such as service level agreements can achieve the same objective.

(2) While the presentation along a continuum may seem to suggest that integration is linear, it is not so. Indeed, several elements of a bank's management could be integrated. The stylised models, each of them based on a single dimension, are thus presented for illustrative purposes only.

the assumption that assets are fungible, may help to re-allocate resources within the group to the different legal entities. In this model, disconnection is complex, as individual entities may not be able to operate on a stand-alone basis.

As explained below, even though they may imply a move along this continuum, depending on the nature of rules introduced, supervisory measures imposing a stand-alone subsidiary model do not aim to make it impossible to adopt one of these models.

1.2 Examples

There are various ways of facilitating crisis management. First, authorities may try to identify, in advance, issues that are likely to complicate crisis management. This is the objective of living wills (see also Box 1), in which large and complex banks are asked to determine how they could easily be dismantled in reaction to a crisis. Reducing the complexity of a banking group will often require changes in its organisational structure or the introduction of some firewalls.

Alternatively, supervisory authorities may also impose general limits on local risks and intra-group dependence. Such measures may include local liquidity rules, for instance. The Consultative Document released by the Basel Committee on Banking Supervision (BCBS, 2009) proposes to introduce two binding liquidity ratios, which would be applied on a consolidated basis, though the document does not exclude the possibility of their local application to a subset of legal entities. The industry, together with some policy makers (see e.g. Strauss Kahn, 2010), argues that local requirements do induce a risk of fragmentation because they create trapped pools of liquidity (i.e. liquidity pools that cannot be easily redeployed within the group). This would therefore hamper the central management of liquidity and would complicate intra-group cross-border flows. However, it should also be noted that once local requirements are met, liquidity can still flow freely within the group and that, consequently, these rules do not impede the reallocation of excess liquidity within a group.

Another example of a regulatory development whose objective would be to reduce internal dependence is linked to the limits that supervisory authorities may want to impose on intra-group exposures. The amended Capital Requirements Directive provides for revision of the large exposures regime, including large intra-group exposures, where national discretion remains possible. Too strict limits on these exposures may make the reallocation of funds within a group more difficult. Similarly, potential capital surcharges for systemic risk, if applied to local legal entities rather than on a consolidated basis, could also induce an increase in costs that may eventually reduce the benefits of cross-border operations (see e.g. IMF, 2010). Yet if these measures impose excessive constraints on a bank's cross-border operations, the bank can still change its legal form of incorporation from a subsidiary model to a branch model (even though there may be some constraints on the legal form – see also section 2). Yet, such a move by the financial industry would also imply a transfer of crisis management responsibilities, from host authorities to home authorities. In certain cases, this transfer may be detrimental for the host country, for instance, if the home country has not the capacity to support the activities of the branch in case of problems (see e.g. Icelandic case).

Box 1 – Reducing complexity through recovery and resolution plans (living wills)

Several international bodies, including the Basel Committee on Banking Supervision (2010) and the Financial Stability Forum (2009), have recommended improving crisis preparation through the design of ex-ante plans. Similarly, in its communication on *an EU Framework for Cross-Border Crisis Management in the Banking Sector*, the European Commission seems to assume that firm-specific contingency and resolution plans constitute one of the elements that can contribute to improvements in the framework for early intervention.

As explained by the FSA (2009), recovery and resolution plans are plans produced by financial institutions. They comprise two different elements:

– *A recovery plan* is a contingency plan drafted by the bank which explains what it intends to do in order to respond to and recover from severe stress. The main assumption of the plan is that authorities do not intervene. The plan needs to credibly explain how the bank, in a severe stress situation, can restore its liquidity and capital position. This may imply restructuring the assets and liabilities of the firm in a drastic way and revising its strategy, including through disposals, an increase in capital, the exit from certain activities, the offloading of risks, etc.
– A *resolution plan*: The resolution plan assumes, on the other hand, that authorities have to intervene to ensure an orderly resolution. The resolution plan, since it is drafted by the bank, does not explain how authorities should resolve the crisis situation but rather how the firm can contribute to the orderly resolution. The bank needs to identify the obstacles to an orderly resolution. For instance, it needs to explain how it intends to unplug itself from key systems and major infrastructures. Practical details, such as provision of information to authorities, also need to be addressed in the resolution plan.

As explained by Huertas (2010), recovery plans contribute towards decreasing the probability of failure of a given institution, while resolution plans help to reduce the cost to society should such failure occur. However, it is important to note that these plans do not specify a path for crisis resolution, as the choice of the recovery or resolution tool depends on the circumstances of the particular crisis.

2. The branch model as an integrated alternative for banks

Sub-section 2.1 describes the different legal forms that banks could use. Sub-section 2.2. discusses the link between crisis management and the choice of a particular legal structure. It then discusses some additional conditions that need to be fulfilled for fragmentation to develop.

2.1 Differences between branches and subsidiaries

The corporate structure determines the extent to which operations are legally considered as forming a single entity or separate legal entities. In the EU, two models are widely used by banks to give a legal form to their foreign activities, namely the subsidiary and the branch.[1] The subsidiary is a separate legal entity with a legal personality. It is supervised by the member state in which it is incorporated and needs to comply with the regulatory framework of that country. The subsidiary is, therefore, subject to potentially specific prudential requirements of that country, including rules on capital and liquidity requirements, if any. In addition, the authorisation of the licensing or supervisory authority of the host country is necessary before a subsidiary can be set up.

The branch, on the other hand, is not legally distinct from its parent company with which it forms a single entity. For instance, the branch has no separate balance sheet, and the capital held to meet requirements arising from assets booked by the branch may be located in the home country. As a consequence, the home country principle applies and the branch is therefore supervised, with the exception of liquidity, by the authorities in the home member state. Branching within the European Union is facilitated by the fact that host authorities, which are notified prior to the opening of a branch, do not have the right to refuse the establishment of the branch if it has been authorised by the home authority.[2]

A distinction needs to be made between the legal structure and the integration of operations (see section 1.1). Indeed, the legal organisation does not necessarily match the structure of the business. For instance, even though a subsidiary is legally distinct from its parent company, its operations may very well be closely integrated into those of the group. When the operations of a subsidiary are highly integrated in those of the group, for instance because key functions are managed centrally, the subsidiary, despite being a legally distinct entity, may no longer be viable on a stand-alone basis. This structure is called a *quasi branch*. The problem of quasi branches is that they are supervised by the host authority, who also manages their crises, even though key functions are centralised in the home country, i.e. outside the jurisdiction of the host authority.

(1) Please note that if EU credit institutions duly notify the host authority, their single passport also enables them to provide banking services directly in another country, without having a permanent presence in that country.
(2) For completeness, it should be noted that another legal form of incorporation, very similar to a branch structure, was introduced in 2004, but with no application in the banking sector so far, namely the European Company Statute (Societas Europeae).

2.2 The relationship between crisis management, the legal structure and risk of re-fragmentation

Some banks tend to say that the choice of the legal structure, be it a branch, a quasi branch or a stand-alone subsidiary, is neutral from a financial stability point of view. They argue that it will be very difficult for a group to let a subsidiary fail without having to face disastrous knock-on effects on the rest of the group. Indeed, to preserve its reputation, the bank is obliged to stand behind its affiliates, whatever their legal form. [1] Similarly, market participants argue that the legal form is not relevant for them because, when a group is in difficulty, access to the market is shut for the group as a whole, including all its subsidiaries and branches. The fact that creditors, in a crisis, do not care about the legal substance of the entity of the bank they face implies that they do not believe in the effectiveness of existing firewalls.

To conclude that the legal structure is not relevant for financial stability is, however, incorrect. Indeed, in a crisis situation, the legal form, as well as the structure of operations, remains important for several reasons. First, the legal structure determines the powers of the home and host authorities both in normal times and in a crisis. For instance, a credit institution and its branches are wound up as a single entity, and the procedure is initiated by the home country. A subsidiary, on the other hand, is wound up by the host authority. The argument that, because of the risk to reputation, the probability of default of the different entities within a group does not depend on the legal form of incorporation may be true. However, in case of failure, the loss-given-default of each of these entities will be eventually determined by the legal structure of the group. In addition, the legal structure also plays a role for insured creditors, as the deposit insurance scheme (and the associated conditions of indemnification – including legal time limits for the reimbursement of insured deposits) may be different if the bank is incorporated as a subsidiary or as a branch. Finally, the subsidiary has its own supervisory board and board of directors. These bodies have to defend the interest of the subsidiary and have to oppose any transfer that would be detrimental to the subsidiary. All these points demonstrate that the decision whether to establish a subsidiary or a branch is not neutral.

Even though this choice is not neutral, authorities cannot force a bank to choose a particular structure. Indeed, the freedom of establishment of a bank headquartered in one of the European member states, entitling it to set up an establishment in another member state, is guaranteed by Article 49 of the Treaty and by Article 23 of the Capital Requirements Directive. As a consequence, any restriction whereby a host authority would limit the choice of the legal structure of foreign establishment would be considered illegal. However, in order to improve the alignment of supervisory responsibilities with crisis management responsibilities, and to provide better protection for domestic depositors, some national authorities may nevertheless contemplate introducing measures that would reduce the dependence of subsidiaries upon their parent company. In other words, some national authorities may evaluate whether a stricter implementation of the stand-alone subsidiary model and the subsequent weakening of the quasi-branch model would be possible in normal times and beneficial in times of crisis.

This option, however, can only be considered as a default option that authorities may nevertheless be forced to choose if a more integrated regulatory, supervisory and crisis management framework cannot be achieved at the European level (see also section 4). Determining the extent to which the generalised use of the stand-alone model could lead to market re-fragmentation is not trivial. Since credit institutions can still, in theory, continue to expand by establishing branches abroad, i.e. remain integrated, it is not clear why cross-border re-fragmentation would necessarily occur. It seems that at least one of two alternative conditions needs to be fulfilled for the generalised use of the stand-alone subsidiary model to lead to a large-scale re-fragmentation of banking markets. First, given that the branch model is an integrated alternative to the stand-alone subsidiary model, there should be some restrictions preventing banks from converting their subsidiaries into branches. That is not legally possible, but as explained in Box 2, this choice may be constrained by other factors. Alternatively, banking market re-fragmentation could also occur if authorities tried to alter the nature of the branch model, imposing some restrictions on branches, in addition to those applicable to stand-alone subsidiaries, so as to make them viable on a stand-alone basis.

(1) However, there is one exception, namely when a crisis is clearly country-related and does not result from mismanagement by the bank. Tschoegl (2005) discusses the cases of Crédit Agricole, Scotiabank and MBK Mercobank during the Argentinean crisis. In each of these three cases, the foreign parent company refused to recapitalise its failed subsidiary located in Argentina, and requested the intervention of the Argentinean government. Note that Scotiabank, nevertheless, did reimburse 20 p.c. of the value of the marketable security issued by its subsidiary, probably in an attempt to salvage its reputation.

Box 2 – Factors driving the choice of the legal structure

In Europe, the Treaty guarantees banking groups the freedom to choose their legal form of incorporation. However, as noticed by Dermine (2006) and the ECB (2010), the subsidiary model seems to dominate cross-border expansion. The choice of the legal form of incorporation is influenced by a broad range of considerations. Actually, given the diversity of these factors, it may be best for a banking group to opt for a branch in some circumstances and a subsidiary in others. Most groups therefore usually comprise both branches and subsidiaries. The factors influencing the choice of a legal structure include:

– *Historical factors*: History plays a major role in the choice of legal structure. There is some inertia in the legal structure, as converting a branch into a subsidiary and vice-versa may become difficult once a given size or complexity is reached. Therefore, it may be easier and cheaper for banks that have expanded across borders through mergers and acquisitions to keep a subsidiary structure.

– *Tax optimisation*: Tax optimisation seems to be a major factor influencing the choice of the legal structure (see e.g. Cerutti et al., 2007). The tax regime applied to subsidiaries differs from the one applied to branches. Some common principles generally apply to the differences in tax treatment of both branches and subsidiaries across Europe, even though some may be country-specific. One of these principles is that, in most cases, losses made by a branch can be offset immediately against the parent company's profits (whereas subsidiaries' losses usually cannot). Generally branches are not subject to dividend withholding taxes, as they do not pay any dividend. Since they form separate legal entities, subsidiaries can keep their profits in the host country, and they are therefore not automatically taxed in the home country. They are taxed in the host country, keeping in mind that, if a subsidiary wants to repatriate profits, it can benefit from the advantages offered under the potential double taxation relief treaties concluded between the host and the home countries.

  Another example of differences in branches and subsidiaries' taxation concerns internal transfer pricing. Since a branch and its parent company are considered as a single entity, there is no need, for tax purposes, to establish internal transfer pricing for transfers of assets (such as liquidity reallocation) or for the provision of shared services. As a consequence, payments made by the branch to its foreign parent company are not usually tax deductible. The price of internal transfers between different subsidiaries, on the other hand, will affect the allocation of profits within the different legal entities of the group and, eventually, the final amount of taxes paid in each of the different locations in which the group is present.

– *Business model*: The business model, and the overall strategy of the group, may require opting for a certain legal structure. For instance, fully decentralised banks usually prefer to operate with subsidiaries, rather than with branches. On the other hand, a branch model may be the preferred choice when the group is run in an integrated way.

– *Limited liability, ring-fencing and internal firewalls*: Banks may prefer to lodge some of their activities (such as asset management) in legally independent entities that are shielded from group problems. The legal structure acts as an internal firewall so as to ensure that some specific activities are not liable for the other activities of the group, as they would be under a branch structure.

– *Preference of the host country authorities*: The host authority may in some cases prefer a given form of legal incorporation. For instance, the host authority may prefer to see a large retail bank incorporated as a subsidiary, in which the local legal entity is subject to minimum capital and liquidity buffer requirements. In such cases, even if the host authority has neither the formal power to impose a certain legal structure, nor the legal authority to do so, it may indicate its preference to the bank, which may then decide to follow the opinion of the supervisor.

– *Features and costs of deposit guarantee schemes*: The deposit guarantee scheme that will have to intervene in case of failure, and to which the bank will have to contribute if funded ex ante, is determined by the form of incorporation. The home country is normally responsible for deposit insurance coverage of branches. A foreign branch may, nevertheless, purchase top-up deposit insurance coverage when the coverage offered in the host country exceeds that in the home country. As far as subsidiaries are concerned, it is the host country that is responsible for deposit insurance coverage. Moving from a subsidiary model to a branch model would imply a change of deposit insurance scheme. This may have an impact on the bank if the terms and conditions of home and host deposit guarantee schemes differ, or if the initial scheme to which the bank contributed was financed ex ante. Indeed, in the latter case the bank may lose the capital already accumulated in the scheme. In addition, as argued by Calzolari and Loranth (2010), the choice of legal form – given that it influences the loss distribution between the different deposit guarantee schemes – may also indirectly influence the incentives of supervisory authorities to control the firm, as well as their potential resolution strategy. These differences are taken into account by banks when they have to choose their preferred form of cross-border expansion.

– *Risk understanding*: A branch model (compared to a stand-alone subsidiary model), may allow a better understanding of the risks taken at the group level, by the group board and management. On the other hand operating with stand-alone subsidiaries may make it easier to manage 'soft' information locally.

– *Option to sell the legal entity*: A subsidiary may be easier to sell than a branch as it is more easily removed from the group. Therefore, if a bank wants to keep open the option of selling some of its activities, it may prefer to adopt a subsidiary model.

3. Would coming closer to the stand-alone subsidiary model be safer and more efficient than keeping a quasi branch model ?

The objective of this section is first to assess the extent to which coming closer to the stand-alone subsidiary model would be beneficial from a financial stability point of view (sub-section 3.1) and, second, to evaluate the impact of such modifications on the efficiency of the banking industry (sub-section 3.2).

3.1 Impact on systemic risk

The adoption of measures implementing the stand-alone subsidiary model would have an impact on systemic risk on both a local and a global scale. In this section, we evaluate the impact of the stand-alone subsidiary model on banks that would previously have been organised with quasi branches. We assume that they keep their legal structure unchanged and do not opt for a pure branch model.

Authorities that choose to implement the stand-alone subsidiary model do so to decrease risks at the local level. However, the global systemic risk is not the sum of local risks, so that it is not obvious that the stand-alone subsidiary model would also lead to a decrease in global systemic risk. Actually, the examination of the impact of these rules on systemic risk – in terms of prudential control, crisis resolution, contagion and risk management (and in particular liquidity risk management) – may lead to a mixed assessment, with undisputed positive consequences at national level, but also some potentially negative unintended side-effects.

For example, in terms of *supervision*, national authorities may be better able to supervise stand-alone entities established in their jurisdiction. Indeed, since these entities do not depend on their parent company, local supervisors do not need to rely on the supervision of the parent company by the home supervisor. On the other hand, the home supervisor may find it more complicated to supervise large, complex financial institutions in fragmented markets, and may encounter significant difficulties in forming an integrated view of the risk taken by the entire group. For instance, it may be especially difficult to evaluate and recognise cross-border diversification gains in a group composed of stand-alone subsidiaries.

The *resolution* of a crisis affecting a group composed of a constellation of stand-alone subsidiaries may, to a certain extent, be easier. First, it clarifies the respective

responsibilities of home and host authorities, since co-operation between national authorities is not necessarily required to solve the crisis. Each national authority is therefore strictly responsible for the entities located in its jurisdiction. Authorities are able to fall back on legal entities that are, or at least may be, viable on a stand-alone or national basis. In addition, it permits better tailoring of the approach to crisis resolution, even in a non-cooperative framework, as it does not require rescuing the whole of a large cross-border banking group if that is not necessary. Indeed, in such a model, it is probably much easier to make a distinction between systemic entities that need to be rescued and the rest of the group.

National entities may also benefit from being self-sufficient if that limits the potential for *intra-group contagion* due to reputation risk. One condition that needs to be fulfilled to reduce the potential for *intra-group contagion* is that the market must be perfectly informed about the group structure and convinced that the various firewalls put in place to protect the subsidiary will be effective. If wholesale lenders have the slightest doubt about these firewalls, they may no longer be effective and, as a consequence, reputation risk would continue to be a major source of contagion. (1)

Even though the model may potentially have a positive effect on local entities in terms of decreased intra-group contagion, it may also, to some extent, affect their capacity to *manage risk* as a group. First, depending on the nature of the stand-alone measures taken, the parent bank may experience more difficulties in implementing a risk management system at the group level, as a consequence of the fragmentation of risk management systems within the group. Second, the stand-alone model might have an impact not only on risk measurement, but also on the capacity to address certain types of risk at the group level, and in particular the liquidity risk.

Indeed, some banks use internal markets for liquidity, in which liquidity management is centralised, as insurance against liquidity shocks. (2) Liquidity shocks arise from the fact that banks need to pay out cash to customers on demand. Where actual liquidity needs deviate from banks' expectations, that implies that some entities within a group may, ex-post, hold excess liquidity or need to obtain liquidity. Internal markets for liquidity and capital are then used within a group for risk sharing purposes, i.e. to manage local entities' idiosyncratic liquidity shocks (see also Box 2 for evidence on Belgium). (3)

The stand-alone subsidiary model may impose some constraints on internal markets for liquidity. If these constraints are too severe, they may hinder a group's ability to marshal resources within the group. However, even though internal markets for liquidity might be constrained by new regulatory developments it should be noted that liquidity can still be redistributed externally, through interbank markets. Yet while internal capital markets have, essentially, a cross-border dimension, this may be less the case for interbank markets. Indeed, a large proportion of interbank transactions in the EU (approximately 70 p.c. – according to the ECB, 2009) are currently effected nationally (i.e. between 2 banks coming from the same country). In mid-June 2008, cross-border interbank deposits represented slightly more than 30 p.c. of interbank deposits, and the percentage of interbank cross-border loans was broadly similar. (4) Consequently, since the cross-border dimension is much more present in internal markets, it could be that interbank markets, in their present form, may be unable to perform perfectly the role currently played by internal markets in insuring against regional liquidity shocks.

Besides, an externalisation of internal capital markets may have some additional consequences. These consequences will differ according to whether an entity is a net lender or a net borrower in the group. If they want to preserve their franchise, net borrowers will have to attract funds on external markets to replace funds previously obtained from the group. However, compared to internal markets, which are centrally managed, external markets may suffer from asymmetric information. The informational advantage which a group enjoys, enabling it to reallocate liquidity in the best possible way, is lost when transactions are executed with an external counterpart. Given this asymmetry of information, there is a risk that, as we saw during the crisis, if counterparts become excessively risk averse, the interbank market freezes and no longer plays its role in liquidity reallocation. Internal markets, because they are not subject to this information gap, would most likely continue to function in identical circumstances.

In addition, a net borrowing entity may face a higher cost of funding on external markets, not only because of information asymmetry, but for at least two additional reasons.

(1) Note that creditors convinced of the efficiency of internal firewalls may nevertheless also decide to run if they fear that other creditors are likely to run because they have reservations about these firewalls.

(2) Liquidity centralisation is, however, not a "universal model", as some large cross-border banks already prefer to operate with a decentralised structure. The extent to which centralisation is the preferred option depends on a range of factors including currency convertibility, the bank's business model, history, size, funding model, cost to transfer funds, available infrastructure, etc. (see also BCBS, 2006)

(3) In addition, thanks to their cross-border dimension, internal markets may also help banks to cope with regional crises. de Haas and van Lelyveld (2010) find evidence of the existence of cross-border internal capital markets. They argue that local subsidiaries, because they profit from parental support, do expand faster and, compared to domestic banks, do not restrain their credit supply when facing a local financial crisis.

(4) Previous studies (see e.g. Manna 2004) have shown that this percentage varies significantly across countries. Interbank markets are still largely national in large countries and more open in smaller countries.

First, if subsidiaries have to become truly self-sufficient and independent from their parent company, group support (and also state support when the group is considered to be too big to fail) may be less likely. As a consequence, their support rating may decrease, with an immediate impact on the cost of funds.[1] Second, in the past, internal markets may have failed to correctly price liquidity. Cross-subsidisation between activities may have helped to develop parts of financial groups that would not have been sustainable otherwise, but this may also have led to excessive liquidity risk taking. So, on the one hand, a higher cost of funding may affect the capacity of some entities to generate profits, and may threaten their business model. However, on the other hand, given the more realistic pricing structure of external markets, the externalisation of funding may also lead to more effective discipline.

The effect on entities that were previously net lenders on internal markets may be different. In this case, the intra-group exposure is replaced by an external risk. The presumably lower concentration of counterparty risk – in an internal model, risks are very much concentrated on other group entities – should be beneficial, but may also creates new channels for contagion or additional exposures.

Stand-alone measures, if not correctly devised, may, therefore lead to a paradoxical result in which each national entity is individually more robust but, at the same time, group risk diversification becomes less effective since the group as a whole no longer acts as a source of strength.

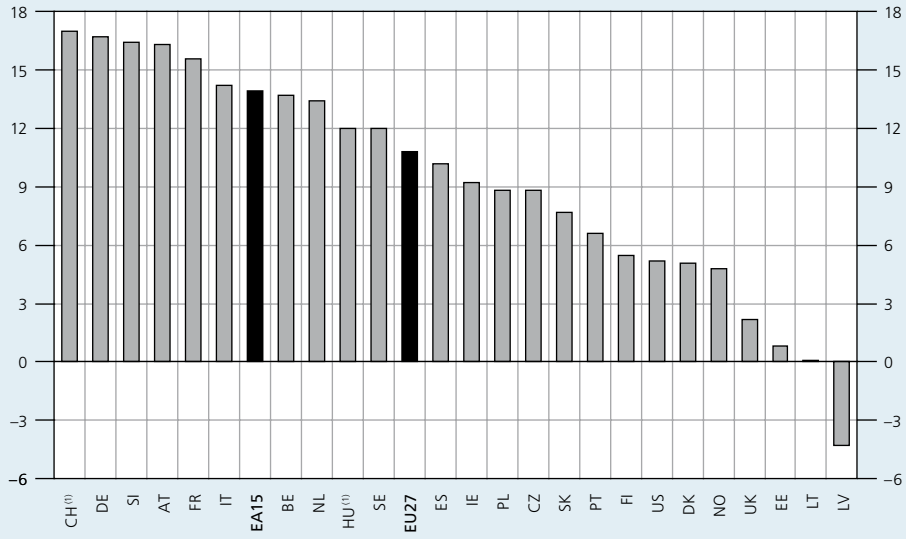
(1) This will also allow to determine the extent to which these measure are credible for markets.

Box 3 – Do Belgian banks operate internal markets? Evidence from intra-group flows

The gross households saving rate in Belgium, as in some other countries, is relatively high (see e.g. Chart 1). In a bank intermediated system, these savings often constitute a significant source of liquidity for banks. Belgian banks, which benefit from substantial sources of retail funding, recycle them either to finance activities in Belgium, or to fund assets originated in Belgium or in foreign countries, or – as Belgium is a small open economy – to support

CHART 1 GROSS HOUSEHOLD SAVING RATE IN 2007

(gross saving divided by gross disposable income – Source: Eurostat (2009))



(1) 2006 Data

foreign activities. As a consequence, the international recycling of these funds often takes the form of cross-border interbank exposures when funds are lent to another bank in a foreign country, or of intra-group cross-border exposures when they benefit an affiliated company within the group.

Two different models coexist in Belgium to recycle savings within a group across borders:
- Liquidity can be recycled via *a parent company* incorporated in Belgium: Belgium is the home country of some large groups that have expanded across borders. The generally cash rich headquarters may recycle part of the excess savings raised in Belgium to finance their foreign subsidiaries.
- Liquidity can be recycled via *Belgian subsidiaries* of foreign banks: some foreign groups benefit from excess savings that were originally raised by their Belgian subsidiaries. The transfers of these excess funds, from the subsidiary to the parent company, may create significant intra-group exposures.

Table 1 summarises data relating to the 7 largest Belgian banks (it includes both Belgian groups and Belgian subsidiaries of foreign groups). These statistics are calculated with figures reported on a territorial basis.[1] They confirm that customer deposits constitute an important source of funding for Belgian banks, as retail deposits represent on average a little bit less than two-thirds of their liabilities. Interbank loans and interbank deposits are fairly similar in terms of their (weighted) average level. Yet, interbank loans in large banks located in Belgium are mostly granted to foreign counterparts, while interbank deposits are more domestic in nature (not shown in the table). In addition, their composition may be different. Indeed, on a territorial basis, we observe that intra-group loans constitute a large part of the total interbank loans (more than half of interbank loans are granted to affiliated companies). On the other hand, deposits from related institutions represent less than one quarter of their interbank deposits. This seems to confirm that Belgian banks contribute towards financing their foreign affiliates.

DESCRIPTIVE STATISTICS ON 7 LARGE BELGIAN BANKS

(December 2009, territorial basis; percentages)

	Min.	Max.	Average	Weighted average
Cross-border intra-group loans as a p.c. of total interbank loans	1.1	97.4	46.2	50.2
Interbank loans as a p.c. of total assets	12.3	97.7	36.8	28.1
Cross-border intra-group deposits as a p.c. of total interbank deposits	5.5	63.4	23.6	23.7
Interbank deposits as a p.c. of total liabilities	6.3	39.1	22.3	28.6
Customer deposits as a p.c. of total liabilities	46.9	90.3	63.3	51.6

Source: NBB.

(1) Foreign subsidiaries of Belgian banks are thus not consolidated in these figures. The figures are reported by the Belgian entity and concern entities located in Belgium.

3.2 Impact on efficiency

The generalised use of the stand-alone subsidiary model could potentially have an impact on the efficiency of the banking industry, and compromise the extent to which cross-border banks could reap efficiency gains resulting from economies of scale[1] and scope (see, *a contrario*, an example of the impact of a de-fragmentation of markets on banks' efficiency in Box 3). Indeed, there is the risk that a strict and comprehensive application of the stand-alone subsidiary model throughout Europe may lead to the

(1) Please note that most empirical studies nevertheless fail to find significant evidence of scale economies in banks. This may be due to the absence of economies of scale or to measurement errors.

development of small entities, focused essentially on their domestic market, that would no longer be able to compete with larger banks, e.g. because they do not reach the necessary size to be competitive on global markets.[1]

For instance, in fragmented markets, banks operating internal liquidity markets and centralising liquidity management may see a decline in the efficiency gains arising from liquidity centralisation. The stand-alone model would entail decentralising treasury management and establishing local desks. That may increase the costs of local operations, as it would imply global increases in staff hired to manage liquidity and the establishment of funding programmes covering all major markets and instruments at a local level. This would also necessitate establishing new local credit lines with financial counterparts and investors, to replace the single credit line with the parent company prevailing in a centralised model. In addition, the capacity to reach a benchmark size in different markets could be severely impaired. However, the adoption of a decentralised model is not, *per se*, inefficient, as several banks do currently operate with a decentralised structure. This form of organisation may, however, prove to be more disadvantageous for certain types of banks.

Secondly, fragmented markets may also result in the constitution of excess capital. Banks target a certain level of economic capital that, given their risk appetite, will be necessary to cover the risks they take. This level of economic capital may exceed the level of their regulatory capital requirements, in which case, the latter are said to be non-binding.[2] The stand-alone subsidiary model, depending on the extent to which it recognises cross-border diversification effects, may lead to higher individual capital requirements, and the sum of these individual capital requirements may exceed the desired level of economic capital. In addition, the private sector has argued that specific national or regional regulatory requirements may result in excess capital and limit the efficient hedging of risks.

Finally, the development of financial infrastructures may also crucially depend on cross-border scale economies. However, fragmented markets limit the extent to which these economies of scale can be exploited across borders, implying potentially higher costs for the development of cross-border infrastructures.

(1) An additional problem may be that, all other things being equal, a locally active stand-alone bank focusing on a large domestic market will be larger than a stand-alone bank centred on a small economy. This might introduce a distortion in the level playing field, especially between banks active in large and small economies. Indeed, imagine that a large bank finances two foreign subsidiaries, one located in a large country and another in a small economy, each enjoying a market share of 10 p.c. of their local market. If these two entities have to become viable on a stand-alone basis, they will have to replace funding from the parent by external funding. The entity located in the small economy may find it harder to compete with larger banks on wholesale markets because it does not reach the benchmark size necessary to raise funds on a wholesale market. The subsidiary located in the large country, because it is larger, may not suffer from the same problem.

(2) Note, however, that although the imposition of regulatory capital requirements sets a minimum level of capital for all banks, observation of a capital buffer does not necessarily imply that these regulatory requirements are not binding. Even in the presence of binding capital requirements, banks may hold capital buffers for several reasons (see e.g. Milne and Whalley, 2001 or Peura and Keppo, 2006).

Box 4 – Case study: the impact of deregulation of interstate branching restriction in the U.S. banking system

Interstate banking and branching restrictions in the U.S. constitute a good example of legal restrictions that impose a cross-border fragmentation of banking markets. These restrictions, that have their origins in the National Bank Act of 1864 and the McFadden Act of 1927,[1] as well as in individual state laws, were initially conceived in an environment in which long distance communications were difficult. As a consequence, potential synergies arising from interstate banking were, at that time, rather limited, while the supervision of banks operating across several states would have been more difficult. These restrictions were also justified by a desire to avoid the failure of a large bank made up of a significant number of branches (see e.g. Sprague 1903).

Interstate branching restrictions were, however, only lifted in 1994,[2] through the enactment of the Riegle-Neal Interstate Banking and Branching Efficiency Act. The cross-border de-fragmentation of the U.S. banking system had an impact not only on the financial industry, but also on the real economy, in various ways.

(1) See e.g. Kane (1996) for an overview of interstate branching restrictions in the U.S over time.

(2) Note that some restrictions had already been removed before many states adopted the Riegle-Neal Act which relaxed branching restrictions between 1988 and 1993. These reforms at state level, however, were not entirely successful in promoting interstate expansion, as it appeared that only a few banks used them to enter new states, and those that did so, expanded locally, entering geographically close markets rather than distant ones (see e.g. McLaughlin, 1995).

a) impact on the banking landscape

First, as Johnson and Rice (2007) notice, banks took full advantage of this wave of deregulation. In 1994, the U.S. had 62 out-of-state branches, while in 2004 there were more than 24,000. This number was achieved by the consolidation of subsidiaries into branches and by the creation of more than 6,000 new out-of-state branches (i.e. approximately 40 p.c. of the total branches created in the same period). This also contributed to the development of "mega banks". DePrince (2005) estimated that the assets of these mega banks grew, on average, from $ 111 billion in 1993 to $ 294 billion in 2003. Admittedly, the growth of these mega banks has been driven by a large number of factors and is, of course, not entirely attributable to the deregulation of interstate branching, especially as a similar movement was also observable in other parts of the world, but the maintenance of these restrictions after 1994 would have constrained the growth of these banks and would probably have hampered this trend. In that sense this Act may have been a necessary condition to support the growth of these banks.

In parallel with the development of mega banks, the market share of small banks decreased. This resulted in an increase in concentration at the national level. According to DePrince (2005), the top five banks accounted for 20 p.c. of total assets in 1993 against 35 p.c. in 2003. Interestingly enough, Strahan (2002), does not notice any increase in local market concentration. He explains this by the fact that interstate branching restrictions did not affect the number of banks operating on intrastate local markets. Therefore, once restrictions were removed, banks expanded through mergers and acquisitions, creating larger banks at the national level, but without any impact on the number of banks operating locally.

b) impact on efficiency and profitability

The total wealth effect associated with the passage of the Riegle-Niel Act was estimated by Brook et al. (1998) at around $ 85 billion. In order to arrive at this assessment, they use a sample of publicly traded banks for which they measure stock returns during the passage of the legislation. They find large abnormal positive gains that were partly attributable to take-over discipline, as these positive stock returns were bigger for poorly performing banks or banks with low insider ownership. These stock movements were also probably driven by expectations with regards to increases in profitability and efficiency. According to Jayaratne and Strahan (1998), the banking industry became significantly more efficient after the removal of interstate branching restrictions.[1] This increased efficiency may result from decreases in overhead costs, increased ability to diversify risks geographically, or from the fact that banks were able to operate on a larger scale. This increased efficiency, may also have resulted from a reshuffling of assets towards more competitive banks, which were suddenly granted the opportunity to acquire market shares in less efficient states. Indeed, Strahan (2002) finds a positive correlation between profit rate and asset growth after restrictions were lifted, but this correlation was non-existent when interstate branching was still prohibited.

The impact on profitability is, however, not homogeneous. Nippani and Washer (2005) find that small banks and large banks saw their returns on assets start to diverge after 1994. While before 1994, small and large banks showed similar rates of return on their assets, with small banks sometimes outperforming large banks, this was no longer the case after 1994, a period in which the rate of return on assets of small banks became significantly lower than the rate achieved by large banks.

c) real impact

Finally, these changes may also have had a real impact. Strahan (2002) finds acceleration in economic growth of individual states (by about 0.56 percentage points), following the branching deregulation. He explains this partly by the fact that access to financing was made easier for new businesses. In addition, the stability of

(1) Not all efficiency gains realised after 1994 can be attributed to the Riegle-Niel Act. According to Nippani and Green (2002), even though banks' profitability and efficiency increased after the Act was passed, most of these changes can be explained by other macro-economic factors. Zou et al. (2007), on the other hand, recognise the impact of macro-economic factors, but still find that the deregulation process also played a significant role in improved performance.

macro-economic indicators improved as local economies were found to become less sensitive to the performance of their banking system. The fact that banks were able to smooth capital shocks over several entities located in different states after the reform, thanks to internal cross-border capital markets, seems to have been a significant factor contributing to macro-economic stability.

However, these studies reflect a pre-crisis positive view on the benefits of restriction lifting, and are currently being questioned and criticised as they may excessively disregard the public benefits of restrictions. For instance, Haldane (2010) argues that the efficiency gains may have been realised at the expense of increased systemic risks and the resurgence of the too-big-to-fail problem.

4. Tension between integration of financial markets and national crisis management responsibilities : how to reduce authorities' incentives to adopt stand-alone subsidiary measures ?

National authorities' incentives to adopt a stand-alone subsidiary regime result from a tension between, on the one hand, the cross-border nature of large financial institutions and the integration of financial markets and, on the other hand, the regulatory and supervisory framework, together with crisis management responsibilities which are still mainly national. This tension may be sustainable in a transitional phase, but is probably insupportable in the long run. A political choice may need to be made to reconcile the geographical scope of the financial industry with the geographical scope of the prudential control framework.

In the absence of supranational coordination, national authorities can only resolve this tension by imposing safeguards on the cross-border expansion of financial groups, e.g. through measures to ensure that subsidiaries established in their jurisdiction are viable on a stand-alone basis. This would be a second-best solution. Depending on the nature of the measures taken, the costs could remain limited or avoided, in a dynamic approach, through limited changes in banks' behaviour. However, if measures are more radical, they could become more expensive for the financial sector and potentially lead to a re-fragmentation of financial markets.

Alternatively, if authorities want to avoid the threat of a re-fragmentation of European financial markets, they may have to consider the adoption of a more European approach, which may appear to be very demanding and difficult. Fonteyne et al. (2010) present a comprehensive framework for more European integration, comprising the development of a European Resolution Authority, a pre-funded European Deposit Insurance and Resolution Fund, and a specific bankruptcy regime for cross-border banks (28th regime). This framework is consistent but probably more realistic only in the long term, and this comprehensive approach may not need to be fully implemented to avoid the risk of re-fragmentation. In the short term, to avoid the risk of re-fragmentation, authorities in Europe should concentrate on four very challenging dimensions.

The first one relates to the consistent application of the regulatory framework, in order to avoid regulatory cross-border arbitrage. This not only helps to minimise distortions in the level playing field, but is also a prerequisite for further development of market integration. The development of a single rule book, with clear limits on national options, would constitute an essential tool contributing to the harmonisation of the regulatory framework. European authorities have already agreed on the need to develop such a rule book, and this task will be entrusted to the newly established European Supervisory Authorities.

Second, the supervisory framework may need to be adapted to take account of the cross-border nature of financial institutions. Prudential supervision is still mainly national. Efforts have been undertaken to give a more European reach to prudential supervision, with the forthcoming creation of the European Systemic Risk Board (ESRB) and the European Supervisory Authorities (ESA). The ESRB will be responsible for the macro-prudential oversight of the European financial system. It will have to detect sources of systemic risk and contribute to their prevention. Besides the ESRB, three new ESAs will be created, namely a European Banking Authority, a European Securities and Markets Authority and a European Insurance and Occupational Pensions Authority. The objective of these three authorities will be to enhance

the quality and the consistency of national supervisory practices, to ensure that cross-border financial groups are adequately supervised, and to develop a European single rule book. A co-operative solution of that kind will probably be sufficient at this stage if other features of the framework, including crisis management, are correctly addressed.

Third, as long as crisis management remains a domestic responsibility, authorities will have incentives to ring-fence assets in order to protect domestic depositors and domestic taxpayers. Authorities' expectations regarding crisis management will, of course, influence how they behave in normal times, what they will tolerate and what they will not. Solving potential conflicts of interests between national authorities in times of crisis does not necessarily require setting up a European agency in charge of crisis management (resolution authority) and creating a European taxpayer (resolution fund), even if this may be desirable for other reasons. However, if they are not created, they need at least to be replaced by intermediate solutions, involving e.g. credible, fair, and binding burden sharing that would contribute to the alignment of interests. These intermediate solutions may also be very difficult to find.

Finally, gaps in the European Union's insolvency law may need to be addressed. For instance, the group concept is not recognised in insolvency law. When a group is bankrupted, each of its subsidiaries is subject to a separate insolvency proceeding. The group cannot be restructured as a group since transfers of assets, collateral, liquidity or capital between multiple group entities cannot be enforced. Recognising the group dimension is, however, extremely challenging from the legal angle, but may be necessary to avoid falling back on national legal entities in a crisis.

The European authorities have started to work on all these different dimensions. For instance, the European Commission communication (see European Commission, 2009), raises these various issues. Addressing them would make a significant contribution towards reinforcing the crisis management framework in a way that could reduce the incentives for authorities to resort to stand-alone subsidiary measures.

Concluding remarks

Because they have to bear the cost associated with the management and resolution of a banking crisis, national authorities in Europe naturally have incentives to ring-fence the assets of banks established in their own country. Some years ago, this behaviour was expected to materialise only in a crisis situation (see e.g. Nguyen and Praet, 2006). Since the crisis, authorities have realised that they may also need to protect domestic interests in normal times, e.g. through stand-alone measures.

National authorities' incentives to adopt a stand-alone subsidiary regime result from the tension between the cross-border dimension of large financial institutions and the domestic nature of crisis management responsibilities. One way to resolve this tension is to further strengthen the European framework for bank supervision and crisis management. However, achieving the necessary changes will be extremely challenging.

Yet in the absence of substantial improvements in the European framework, national authorities may not have any other way of resolving this tension, except by imposing limits on the cross-border expansion of banks. The financial sector has expressed its concerns about the risk of cross-border re-fragmentation of banking markets that this model could imply. However, it is not obvious that this model would automatically lead to large-scale re-fragmentation. First, a distinction needs to be made between the integration of financial institutions and the re-fragmentation of financial markets. The fact that financial institutions would be slightly less integrated would not necessarily put European integration at risk. Second, the cost of these measures may eventually remain limited. In addition, in many instances, banks can adapt their behaviour and operations in ways that simultaneously limit the cost associated with these measures and satisfy the supervisor. Finally, banks still have the option of operating via branches. Re-fragmentation will only happen if banks face additional restrictions on the choice of their legal structure or if branches have to become self-sufficient themselves.

Yet, introducing stand-alone measures remains a subtle exercise, that requires authorities currently contemplating the adoption of such measures to consult all stakeholders to find the delicate balance between, on the one hand, measures that would contribute towards strengthening the national financial sector and limiting the cost of crisis management to the domestic taxpayer, and, on the other hand, measures that would impose excessive constraints on the financial industry and limit the benefits of market integration.

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In search of timely credit risk indicators : a view of the current crisis from a market-implied ratings perspective

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Introduction

An important challenge for financial authorities in avoiding a future level of financial distress equal to that experienced in the current crisis will be to identify and assess risks to financial stability in an accurate and timely manner. Such a task requires the collection of a wide range of information, as well as the development of appropriate analytical tools, such as financial stability indicators and early warning signals. Among these should be indicators of banks' default probabilities and credit risk, since monitoring and managing credit risk in the financial system is of crucial importance for financial stability. Such indicators should have the following characteristics. First, they should provide a timely signal of imminent increases in credit risk. The timeliness of the signal is of crucial importance as this determines the ability to maintain financial stability or to limit emerging portfolio losses. Second, changes in credit risk indicators should signal changes in credit risk and not other factors that are unrelated to credit risk. This will help to avoid false alarms or a false sense of confidence. Finally, a third characteristic of credit risk indicators should be a certain degree of stability in times when credit risk is unchanged.

In their search for indicators that possess these characteristics and in order to obtain a broader assessment of banks' credit risk, financial authorities complement confidential supervisory information with publicly available information, such as long-term ratings provided by rating agencies and market prices (e.g. CDS spreads). However, the events in the current crisis have raised questions about risk indicators. In particular, rating agencies are blamed for not having noticed the build-up of risk in the system and for reacting only when it was too late. Similarly, markets are considered to have severely underpriced risk in the run-up to the crisis, raising substantial doubt concerning the efficient markets hypothesis. In addition, market prices (such as CDS spreads) are known to reflect factors other than credit risk, such as market liquidity, investors' risk aversion or general market sentiment.

This raises the question of the usefulness of these signals for macro-prudential supervision. The likely answer is that there is merit in knowing the markets' perception of credit risk, at least under the condition that the credit risk information is accurately filtered out from the other information in market prices. Instruments that are claimed to possess this characteristic are the so-called market-implied ratings (MIRs), which are constructed by combining information from market prices and long-term ratings, and which have recently been introduced by rating agencies as market-based indicators of credit risk. According to the rating agencies, MIRs offer a timely, accurate and easily interpretable representation of market-based information on the credit quality of the issuer of the rated instrument. In particular, MIRs are claimed to isolate changes in risk for individual issuers from the noise of the markets (see e.g. Moody's, 2009). For these reasons, MIRs appear to be actively used by central banks, financial institutions and investors as a complement to long-term ratings and market prices.

In this article, we provide a critical assessment of MIRs. In particular, we investigate whether these indicators offer a more precise measure of credit risk than other credit risk indicators (for instance CDS spreads) and whether information about credit risk is incorporated into one type of MIR more quickly than in the other (CDS-implied ratings versus equity-implied ratings) or than in market prices (CDS spreads).

We use daily data on MIRs from a major rating agency for a sample of 30 large European and US banks covering the period 2005-2009 to compare the behaviour of CDS-implied ratings (CDSIRs) and equity-implied ratings (EIRs) as well as CDS spreads. To our knowledge, we are the first to provide this type of critical assessment of MIRs. As our sample period covers both the run-up to the current crisis and the main events that have occurred during the crisis, we are able to exploit the large variation in the data to provide some basic insights on these market-based indicators of credit risk. As a consequence, we also contribute to the growing literature that studies the events of the current crisis and their consequences.

Our analysis suggests that MIRs are unlikely to fully overcome the deficiencies of their underlying components (long-term ratings and market prices). Instead, the changes in MIRs seem to reflect movements in the underlying market prices which appear to be related to factors other than credit risk, such as market liquidity, investors' risk aversion or general market sentiment. In particular, the behaviour of MIRs obtained from the CDS market and those obtained from the equity market is not always similar. That is, the relationship between CDSIRs and EIRs is time-varying. In addition, the two types of MIRs also seem to differ somewhat in their relationship to CDS spreads. Finally, while we find that during the crisis period, movements in CDS spreads often lead movements in CDSIRs as one would expect, there is no clear leading-lagging relationship between CDSIRs and EIRs.

The remainder of the article is organized as follows. In Section 1, we compare market-implied ratings to more traditional indicators of credit risk (CDS spreads and long-term ratings). In Section 2, we describe our data and examine the general behaviour of the credit risk indicators over time. In Section 3 we consider the contemporaneous relationship between CDSIRs, EIRs and CDS spreads in order to determine to what extent the two types of MIRs appear to be equivalent measures of credit risk. Section 4 presents a preliminary discussion regarding the lead-lag relationship between our market-based metrics of credit risk. Finally, in Section 5 we summarize our main conclusions and outline an agenda for future research on the topic.

1. Market-implied ratings compared with other indicators of credit risk

MIRs are a new type of credit rating that has been recently introduced by rating agencies (see e.g. Fitch Ratings (2007a,b), Moody's (2007) and S&P (2009)). These ratings aim to combine the pure credit risk focus and stable nature of long-term ratings with the timeliness of information provided by market prices (CDS spreads, equity prices, bond prices etc.).[1] For instance, CDS-implied ratings (CDSIRs) are derived by combining credit information obtained from CDS spreads and long-term ratings. Similarly, equity-implied ratings (EIRs) are obtained by first using techniques to extract credit risk information contained in equity prices (such as default probabilities estimated on the basis of a Merton-type

(1) CDS are credit derivatives that 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, …) on a reference entity.

Box 1 – Methodology of market-implied ratings

In this box, we describe in general terms the methodology used by rating agencies to extract credit risk information from market prices and construct equity-implied and CDS-implied ratings.

While the specifics of the methodologies applied by the rating agencies to obtain MIRs show some differences, the general idea is always the same. In particular, the rating agencies consider a reference sample of firms sorted by the firm's long-term rating. Given this sample of firms, the methodologies consist of three steps: (1) obtain credit risk information from market prices for each firm in each long-term rating category, (2) obtain boundaries between adjacent rating categories, and (3) determine each firm's MIR.

STEP 1: OBTAIN CREDIT RISK INFORMATION FROM MARKET PRICES

For CDS-implied ratings, the relevant credit risk information is simply the (smoothed) CDS spread of the firm. For equity-implied ratings, a proxy for the firm's default probability (PD) is extracted from equity prices using some Merton-type structural model of credit risk.

STEP 2: OBTAIN BOUNDARIES BETWEEN ADJACENT RATING CATEGORIES

In general, the level of the credit risk implied by market prices is expected to be larger for lower long-term rating categories; CDS spreads (or Merton-type PDs) of AA firms are generally larger than CDS spreads (or Merton-type PDs) of AAA firms, and so on for lower rating levels. To allow a mapping from the market-based credit risk information to a MIR for each firm in the sample, cut-off points in terms of the credit risk information marking the boundaries between each long-term rating category are calculated. These cut-off points are not fixed in time, i.e. they usually move together with the observations on the credit risk information obtained from market prices within each long-term rating category. For instance, when a substantial number of observations within one or both of two adjacent rating categories see their relevant measure increasing, the boundary separating the two rating categories will increase as well. (1)

STEP 3: DETERMINE EACH FIRM'S MIR

A firm is assigned a MIR on the basis of where its credit risk observation is situated compared to the boundaries separating the different long-term rating categories. For a firm to have its MIR equal to its long-term rating, the firm's observation on the credit risk information (CDS spread or Merton-type PD) should be situated within the boundaries of the credit risk information for its long-term rating category. A firm outside the boundaries of its long-term rating category is assigned the MIR that is equal to the long-term rating within the boundaries of which the firm's observation of the credit risk information is situated.

To illustrate, consider for instance a two-scale long-term rating system (AAA and AA) and assume that the CDS spread level that is calculated as the boundary between AAA and AA rated firms equals 10 basis points (bp). This implies that firms with a CDS spreads below 10 bp will have a CDSIR of AAA, and those with a CDS spread above 10 bp will have a CDSIR of AA.

(1) Depending on the rating agency and MIR considered, the sample of firms used to determine the boundaries may consist of all firms rated by the agency across sectors and geographic regions, or some segmentation of firms by e.g. sector and geographic location. Also, boundaries may be updated more or less frequently depending on the agency and the type of MIR.

structural credit risk model), then mapping the credit risk information into ratings. Box 1 gives more details on the methodology used by the major rating agencies for constructing CDSIRs and EIRs (due to data availability, this article does not consider another type of MIR, bond-implied ratings).

Two key characteristics of MIRs are the following. First, in contrast to market prices and long-term ratings, MIRs are a relative measure of credit risk (in the cross-sectional dimension). For instance, if all firms' CDS spreads (or Merton-type PDs) were to double *ceteris paribus*, this would have a very limited or even no impact (depending on the credit rating agency considered) on the distribution and the level of MIRs because all the boundaries that separate the different market-implied rating categories would double as well. Therefore, holding long-term ratings constant, changes in a firm's MIR indicate relative under- or outperformance of the firm in terms of CDS spreads (or Merton-type PDs) compared to other firms in the sample.

Second, as MIRs are updated daily following changes in market prices, they may in principle vary on a daily basis. However, in practice, daily changes are not observed. This is due to at least three reasons. First, as just explained, for given long-term ratings, a firm's MIR will likely not change when it performs in a similar way as its peers in terms of

the CDS spread or Merton-type PD, even when movements in market prices are large. Second, if a firm does under- or outperform the other firms in the sample, this relative under- or outperformance should be sufficiently large in order to cross the boundaries separating the different rating categories. Third, for given CDS spreads or Merton-type PDs, MIRs may also change due to changes in long-term ratings. However, long-term ratings change very infrequently, and hence, will not result in frequent changes in MIRs. All this implies that MIRs, while reflecting market information, nevertheless offer some stability to their users.

Besides these two key characteristics, MIRs also possess a number of desirable features. First, MIRs are expressed in the familiar ranking ranging from AAA for the most creditworthy firms to C for the firms with the highest credit risk. Consequently, MIRs are based on a scale that facilitates comparison of credit risk for different firms. Second, as MIRs incorporate market information, they may signal changes in credit risk in a more timely manner than long-term ratings do. In addition, because MIRs combine two sources of information (long-term ratings and market prices), they may also provide a more complete view on credit risk than either source of information alone. Finally, and perhaps most important, MIRs may be a more precise and stable measure of credit risk than market prices, since their aim is to isolate changes in credit risk for individual issuers from other information in markets prices. In fact, MIRs were created with the objective of capturing disagreements between long-term ratings and market prices and to give a clean measure of credit risk. Hence, at face value, MIRs seem to possess all the characteristics of a "good" credit risk indicator identified in the introduction (timeliness, accuracy and stability).

A natural question is therefore whether MIRs could potentially be more useful for measuring credit risk than more traditional credit risk indicators, such as long-term ratings or market prices. For example, could MIRs potentially be used as a complement to supervisory information for monitoring emerging risks in the financial sector?

An important argument for such a use is that, in contrast to MIRs, traditional credit risk indicators do not seem to possess all the desirable features identified in the introduction. More precisely, these indicators seem to trade-off between accuracy and stability on the one hand, and timeliness on the other, in identifying emerging credit risk.

In particular, whereas long-term ratings, which represent the rating agencies' views on credit risk, are supposed to have a pure credit risk focus and a through-the-cycle nature that is intended to provide stability to the measure, their major drawback is that, because of this through-the-cycle nature, they adjust more slowly than market prices to changes in risk, as illustrated by the current crisis. Market prices, on the other hand, embody market participants' views on credit risk and may provide more timely signals of financial stress since they quickly react to the available information on changes in credit risk. However, market price movements are likely to also reflect other factors that may be unrelated to credit risk, such as market liquidity, investors' risk aversion or general market sentiment. This is not only true for equity prices, which in general may be expected to depend on all factors that affect the firm's future profitability (both upside and downside), but also for credit default swaps.[1] Therefore, even though CDS in principle closely relate to credit risk and are considered to be a purer measure of credit risk than equity prices, CDS spreads may only be a noisy signal of credit risk.

Given the apparent desirable properties of market-implied ratings and the shortcomings of market prices, it is interesting to investigate in more details whether the former offer a more precise measure of credit risk than the latter, and whether information about credit risk is incorporated into one type of market-implied ratings more quickly than in the other (CDS-implied versus equity-implied ratings) or than in market-prices (CDS spreads). In the remainder of the article, we provide a first attempt to shed light on these issues.

2. General behaviour of MIRs and CDS spreads

In this section, we describe the evolution of average CDSIRs, EIRs and CDS spreads for a sample of European and US banks during the period 2005-2009. We also provide some summary statistics on the variation in these variables for individual banks.

Our data consists of a sample of 30 banks, of which 20 are European and 10 US-based and for which CDSIRs, EIRs, and 5-year senior CDS spreads are available over the period 1 January 2005 to 31 December 2009. This period covers both the run-up to the current crisis as well as several major events during the crisis. The banks in the sample were required to have at least 150 observations per year for each of the three data series. In addition, we dropped banks for which one of the data series is missing for at least 10 consecutive trading days.[2]

(1) See e.g. Collin-Dufresne et al. (2001), Bongaerts et al. (2010) and Annaert et al. (2010).

(2) We impose this criterion to reduce errors caused by the choice to replacing missing observations by moving forward the last observation. If too many observations are missing, by replacing them in this way, the series would no longer be representative. Moreover, for some banks, there were long periods with no observations during the crisis and the series pre- and post-crisis did not longer refer to same legal entity.

The central component of our data is a unique dataset on daily MIRs for financial institutions, which, together with the institutions' long-term credit ratings, were obtained from a major credit rating agency (Moody's). As mentioned in the previous section, MIRs essentially are credit ratings derived from market prices and long term ratings. That is, they are expressed in the familiar ranking ranging from AAA for the most creditworthy firms to C for the firms with the largest credit risk.[1] However, as they incorporate information provided by market prices, they change more frequently than long-term ratings do. In particular, the average number of changes in CDSIRs per year for each individual bank in our sample over the period 2005-2009 amounts to almost 33. The corresponding number for EIRs equals about 23, whereas the long-term rating of the banks in our sample only changes less than 1 time per year on average. These figures confirm that, while being more volatile than long-term ratings, MIRs are much more stable than market prices, which may be a desirable property.

(1) In the analysis, we transform these rating classes into numerical values between 20 for the most creditworthy banks and 1 for the least creditworthy ones: AAA=20, AA+=19, AA=18, AA-=17, A+=16, A=15, A-=14, BBB+=13, BBB=12, BBB-=11, BB+=10, BB=9, BB-=8, B+=7, B=6, B-=5, CCC+=4, CCC=3, CCC-=2, CC and below=1.

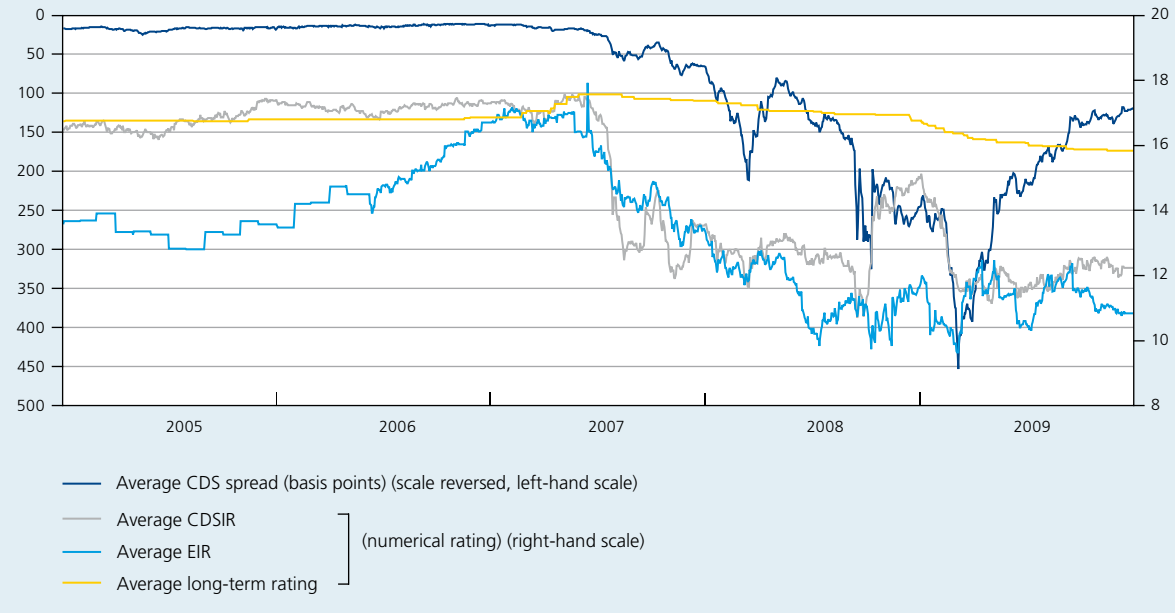
As mentioned above, we examine the relationship between the two types of MIRs and compare their behaviour relative to CDS spreads. We therefore also obtained daily data on 5-year senior CDS spread for our sample banks from Datastream. Note that we do not consider equity prices in our analysis because they are not, from a theoretical point of view, a "pure" measure of credit risk, as they incorporate information on the "upside" of profitability as well as the "downside".

2.1 Initial comparison of the credit risk indicators

Chart 1 compares the historical evolution of average CDSIRs, EIRs and CDS spreads across the banks in our sample. For comparison, we also plot the evolution of the average long-term rating for the banks in our sample.

We can immediately observe significant variation in these series over the sample period. In fact, the average CDS spread across all banks has an overall mean of 89 bp and ranges from a minimum of 10.8 bp to a maximum of 453.2 bp. The overall means of the average CDSIRs and EIRs across the banks in our sample amount to 14.9 and 13.3; these numerical values correspond to ratings between A and A-, and A- and BBB+, respectively.

CHART 1 HISTORICAL EVOLUTION OF AVERAGE CDS SPREAD, CDSIR, EIR, AND LONG-TERM RATING OVER THE PERIOD 1 JANUARY 2005 – 31 DECEMBER 2009



Sources : Own calculations based on data from Moody's and Datastream.

(1) CDS spreads are mid-prices expressed in basis points (bp). The scale for CDS spread is inverted and appears on the left axis. CDSIRs, EIRs and long-term ratings have been transformed to a numeric scale that appears on the right axis: AAA=20, AA+=19, AA=18, AA-=17, A+=16, A=15, A-=14, BBB+=13, BBB=12, BBB-=11, BB+=10, BB=9, BB-=8, B+=7, B=6, B-=5, CCC+=4, CCC=3, CCC-=2, CC and below=1.

Average CDSIRs fluctuated between a minimal value of 10.7 (BBB-) and a maximal value of 17.6 (AA); the corresponding values for the average EIR across the banks in our sample amount to 9.6 (BB+) and 17.9 (AA), respectively. Finally, average long-term ratings showed substantially less variation, ranging from 15.8 (A+) to 17.6 (AA), around a mean value of 16.8 (AA-).

Overall, the market-based metrics in Chart 1 react in a much stronger way to the events occurring during the crisis than long-term ratings do. However, the behaviours of CDSIRs and EIRs do not always seem to coincide. For instance, in the period before July 2007, CDSIRs are quite stable while EIRs increase significantly. In addition, the two series in fact move in opposite directions in October 2008. The different behaviour observed in the two MIRs may be due to specificities in the construction of MIRs.[1] However, it may also be the case that these measures are not necessarily driven by individual credit risk alone, but, like CDS spreads or equity prices, may also reflect non-credit risk related factors such as market liquidity, investors' risk aversion, or general market sentiment. Finally, while showing some differences in the evolution of the three market-based metrics of credit risk, the plotted series in Chart 1 do not allow strong conclusions to be drawn regarding the lead-lag behaviour of the different metrics.

Looking at Chart 1 in more details, three main periods can be distinguished: before the crisis (up to July 2007), the crisis period up to government interventions (from July 2007 up to September 2008), and the crisis period after government interventions (after September 2008).

The credit risk indicators in Chart 1 would seem to indicate that credit risk in the banking sector was stable at a relatively low level (or even decreasing) over the period from 2005 to mid 2007. In particular, average long-term ratings are stable at levels between A+ and AA- and CDS spreads remain fairly constant at levels below 50 bp until June 2007. The same is true for average CDSIRs, which are relatively stable around a level close to AA-. Interestingly, even though they are supposed to measure credit risk in a similar way, average EIRs show a somewhat different behaviour; starting at a level close to A- at the beginning of our sample period, they show a strong but gradual upward trend, closing the gap with CDSIRs towards early 2007.

This observed pattern of EIRs closing the gap with CDSIRs is actually very similar to the behaviour of equity prices of the banks in our sample; while CDS spreads remain fairly constant in this period, equity prices (as shown in Chart A1 in the appendix) show a clear upward trend until June 2007. The behaviour of the CDSIRs and EIRs therefore seems to suggest that these measures pick up movements in the underlying price series that are not necessarily related to individual credit risk but rather reflect factors such as bank profitability or general market sentiment.

During the crisis period (starting in July 2007 with the negative disclosures on subprime credit risk of Bear Stearns' hedge funds), all market-based metrics (CDSIRs, EIRs, CDS spreads) significantly drop[2], probably due to increased investor concern about banks' exposure to subprime mortgages. The plotted series in Chart 1 give the impression that MIRs signal the start of the crisis somewhat earlier than CDS spreads do.[3] Although long-term ratings also gradually decline after the start of the crisis in July 2007, the market-based metrics indicate a much more pronounced increase in the level of credit risk. This is particularly true for the periods when the most important negative events of the crisis took place: e.g. Bear Stearns' hedge fund closures in July 2007, Bear Stearns' takeover in March 2008, Northern Rock in September 2007 and February 2008, the Icelandic banks, Fannie Mae, Freddie Mac, AIG and Lehman Brothers (among others) in September 2008. These episodes would seem to indicate that the market-based metrics signal a large increase in credit risk. However, to the extent that MIRs reflect movements in the underlying price series which are unrelated to changes in credit risk for individual institutions, their significant drops, like CDS spreads, may also reflect factors such as a steep contraction of the risk appetite of market participants.

In October 2008, following various government interventions, CDSIRs show a significant jump upwards (+3 rating notches, from BBB- to A on average). CDS spreads also improve, while EIRs seem to move in an opposite direction. These movements are consistent with similarly opposite movements observed in CDS spreads and equity prices during the same period; however, they are inconsistent with the idea that EIRs and CDSIRs both measure credit risk. Potential explanations for the contrasting movements in CDS spreads and equity prices have been provided by market participants and researchers; i.e., that the government interventions benefited creditors and CDS protection sellers at the expense of shareholders.[4] That is, whereas capital injections increase the loss absorption

(1) Specificities in the mapping of market prices into the traditional rating scale may result in a different behaviour of CDSIRs and EIRs. One example of this may be the use of a different sample of firms used in the construction of CDSIRs than for the construction of EIRs; as MIRs reflect a bank's relative credit risk compared to the other firms in the sample (see Box 1), a different reference sample of firms may result in a different behaviour of the bank's MIRs.

(2) CDS spreads in non-reverse scale increase.

(3) Although MIRs are constructed from the underlying price series, the possibility that MIRs lead the movements in prices cannot be ruled out due to specificities in the construction of MIRs. For a more detailed explanation, we refer to Section 4.

(4) See e.g. Panetta et al. (2009) and King (2009).

buffer before creditors are hit, existing equity holders are worse off, since their share in the capital of the firm is diluted. However, this should not have affected the credit risk signals obtained from EIRs, which, as explained above, are constructed with the purpose of extracting credit risk information from the other drivers of equity prices. The opposite reaction of EIRs compared to CDSIRs provides additional support for the observation that CDSIR and EIR movements do not always coincide and seem to follow similar patterns as the underlying CDS spreads and equity prices. This suggests that the credit risk signals provided by MIRs may be distorted by other determinants of the underlying price series.

Despite the government interventions, the upward jump in CDSIRs was later followed by a strong downward correction, and CDS spreads (inverted scale) and EIRs reached their lowest values in March 2009. The decline in equity prices (Chart A1 in the appendix) and consequent contraction in the risk appetite of market participants, together with the increase in CDS spread volatility, may have caused a contraction in CDS transactions and a consequent increase in CDS spreads from October 2008 to March 2009, despite the government interventions. This movement seems to be followed by the MIRs, which decline during this period. From March 2009 onwards, MIRs and CDS spreads seem to have entered a recovery period, which is more pronounced for the CDS-based measures than for EIRs.[1] The three market-based indicators of credit risk are nevertheless still at substantially worse levels than before the crisis. Long-term ratings seem to be still in a downward movement, which together with their more gradual decline during the crisis, may reflect their through-the-cycle nature. This more gradual and continuing decline in long-term ratings limits the potential for MIRs to quickly revert to higher levels; since MIRs are constructed from long-term ratings, this may be an explanation as to why CDS spreads seem to indicate the recovery after March 2009 earlier than the MIRs.

2.2 Bank-level variation in the credit risk indicators

Table 1 provides a summary of some bank-level statistics on the ranges (i.e. differences between maximum and minimum values) of CDS spreads and MIRs for individual banks over the sample period and the maximal observed daily difference between EIRs and CDSIRs during the period.

The first row of Table 1 indicates that for the median bank, the CDS spread varied over a range of 268.8 bp. The bank with the lowest variation saw its CDS spread cover a range of 55.2 bp, whereas the bank with the highest variation experienced a range of almost 3000 bp. These statistics show that there were significant differences across the banks in the sample with respect to the variation in their CDS spreads during the period.

TABLE 1 BASIC SUMMARY STATISTICS FOR RANGES OF CDS SPREADS, CDSIRS, AND EIRS, AND THE MAXIMAL ABSOLUTE DIFFERENCE BETWEEN EIR AND CDSIR

	Median	Min.	Max.
CDS spread range	268.8	55.2	2,949.2
CDSIR range	8	7	14
EIR range	11	5	19
Max. diff. between EIR and CDSIR	8.5	5	14

Sources: Own calculations based on data obtained from Moody's and Datastream.
Notes: The first three rows of Table 1 present the cross-sectional median, minimum and maximum for the difference between the maximal and minimal value of each variable calculated at bank-level. The fourth row of Table 1 shows the cross-sectional median, minimum and maximum for the maximal absolute difference between the EIR and CDSIR for each bank over the sample period. The summary statistics in the table are based on a cross-section of 30 observations, the total number of observations used to compute the numbers is 39,120. CDS spreads are mid-prices expressed in basis points (bp). CDSIRs and EIRs have been transformed to a numeric scale: AAA = 20, AA+ = 19, AA = 18, AA– = 17, A+ = 16, A = 15, A– = 14, BBB+ = 13, BBB = 12, BBB– = 11, BB+ = 10, BB = 9, BB– = 8, B+ = 7, B = 6, B– = 5, CCC+ = 4, CCC = 3, CCC– = 2, CC and below = 1.
The maximal observed daily difference between EIRs and CDSIRs is expressed in absolute values.

Table 1 also reveals significant variation for banks' CDSIRs and EIRs. For the median bank, the CDSIRs varied by 8 notches over the period and the median range of EIRs was 11 notches. The bank with the largest range for CDSIRs over the period saw a difference of 14 notches, and the bank with the largest range of EIRs experienced a difference of 19 notches.

Finally, we consider the maximum observed daily differences between banks' EIRs and CDSIRs during the period. For the median bank, the maximum daily difference (in absolute value) observed during the period was 8.5 notches. The bank reporting the greatest maximum difference between the two ratings saw a difference of 14 notches. In other words, on some day during the sample period, the EIR and CDSIR for this bank differed by 14 notches.

(1) Equity markets' movements in the second quarter of 2009 (see Chart A1 in the appendix) reflect growing confidence that the worse of the crisis had passed.

3. Contemporaneous relationship between MIRs and CDS spreads

As explained above, MIRs are claimed to filter out changes in credit risk for individual issuers from other information embodied in market prices. If MIRs succeed in doing so, they could potentially offer more precise measures of credit risk than CDS spreads. However, the discussion in the previous section already suggests that this may not be the case. As empirical evidence regarding the factors that affect MIRs does not exist, the existing literature does not provide us with an answer to the question of whether MIRs reflect other factors than credit risk. [1] Whereas such an analysis is beyond the scope of this article, we nevertheless provide a first step. In particular, if MIRs indeed succeed in filtering out credit risk signals from market prices, then MIRs based on different market prices should provide very similar signals regarding the credit risk of an institution and exhibit similar relative behaviour over time. We investigate this more in detail here, using two complementary approaches. First, we analyze the behaviour of the average value of the ratio of banks' EIRs over CDSIRs over the sample period. Second, we examine correlations between changes in banks' EIRs and CDSIRs as well as correlations between EIRs and CDS spreads, and between CDSIRs and CDS spreads.

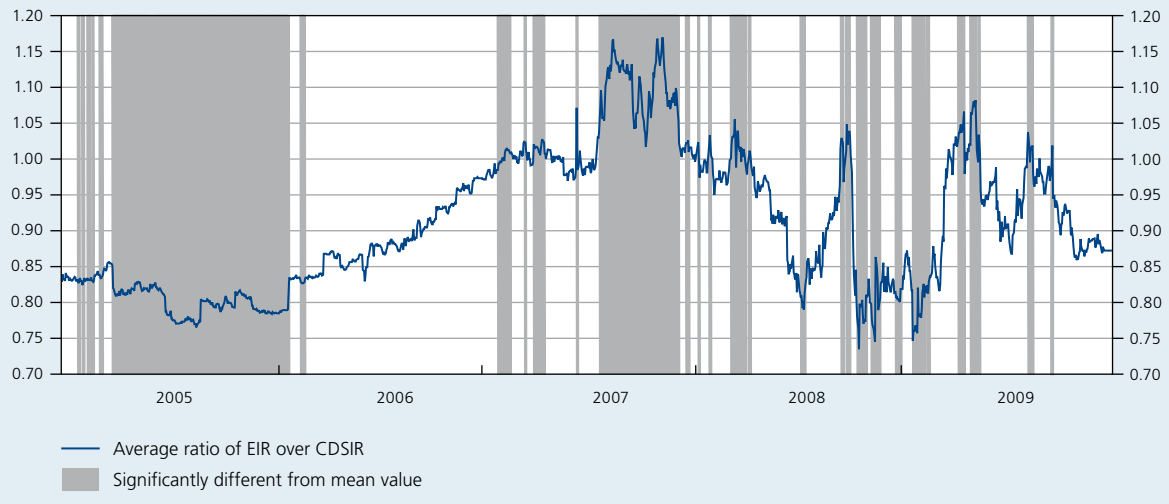
(1) See reports on MIRs from rating agencies, e.g. Fitch Ratings (2007a,b) and Moody's (2007) that show how the difference between MIRs and long-term ratings (rating gaps) relate to default probabilities.

3.1 Ratio of EIR over CDSIR

Chart 2 plots the daily average across banks of the ratio of the EIR over CDSIR for each bank. As suggested above, one might expect that MIRs should provide the same signal regarding the intensity of credit risk at all times. However, this may not necessarily be the case for a number of reasons. First, it may be that, for reasons relating to the computation of MIRs, the default probability associated with a AAA CDSIR may not be the same as the default probability implied by a AAA EIR. However, we would nevertheless expect CDSIRs and EIRs to move in a similar manner over time for each bank, such that their ratio equals some constant. Second, to the extent that different markets (CDS versus equity) incorporate credit risk information at different speeds, we would not expect the ratio of EIRs over CDSIRs to be equal to a constant at all times. However, deviations from this constant should not be persistent, in that the ratio of EIRs over CDSIRs should revert back to its mean as soon as the credit risk information is incorporated in both markets. Persistent deviations from the mean value would suggest that MIRs do not signal potential changes in credit risk in an equivalent manner.

The line in Chart 2 shows the movement of the average across banks of the ratio of EIRs over CDSIRs over the sample period. A first observation is that this ratio is not constant over time; whereas the mean over the entire sample period of the average ratio of EIRs over CDSIRs equals 0.91 (which, with a standard deviation of 0.10, is

CHART 2 AVERAGE RATIO EIR OVER CDSIR FOR SAMPLE OF 30 BANKS



Sources : Own calculations based on data from Moody's.

not significantly different from 1), the daily average ratios fluctuate between about 0.75 and 1.15. Note that these ratios are again daily averages across banks; as shown in Table 1, differences between EIRs and CDSIRs for any given bank may be substantial (up to 14 notches).

To see whether these fluctuations are the result of the different speeds with which different markets incorporate credit risk information, we test whether deviations from the mean value for the ratio over the sample period (0.91) are significant and persistent. We proceed as follows: for each time period, we perform a t-test to see whether the average ratio of EIRs over CDSIRs across the 30 banks in our sample equals 0.91. The grey areas in Chart 2 indicate at which point in time the average ratio of EIRs over CDSIRs is significantly different from 0.91. Although the test indicates that EIRs and CDSIRs were providing similar credit risk signals in the run-up and, to a lesser extent, during the first part of the crisis (January 2008-September 2008), in several periods both before and during the crisis the deviations from 0.91 were significant, indicating that EIRs and CDSIRs were actually providing different (credit risk) signals in these episodes. In addition, these periods of disagreement seem relatively persistent, sometimes covering several weeks or even months.

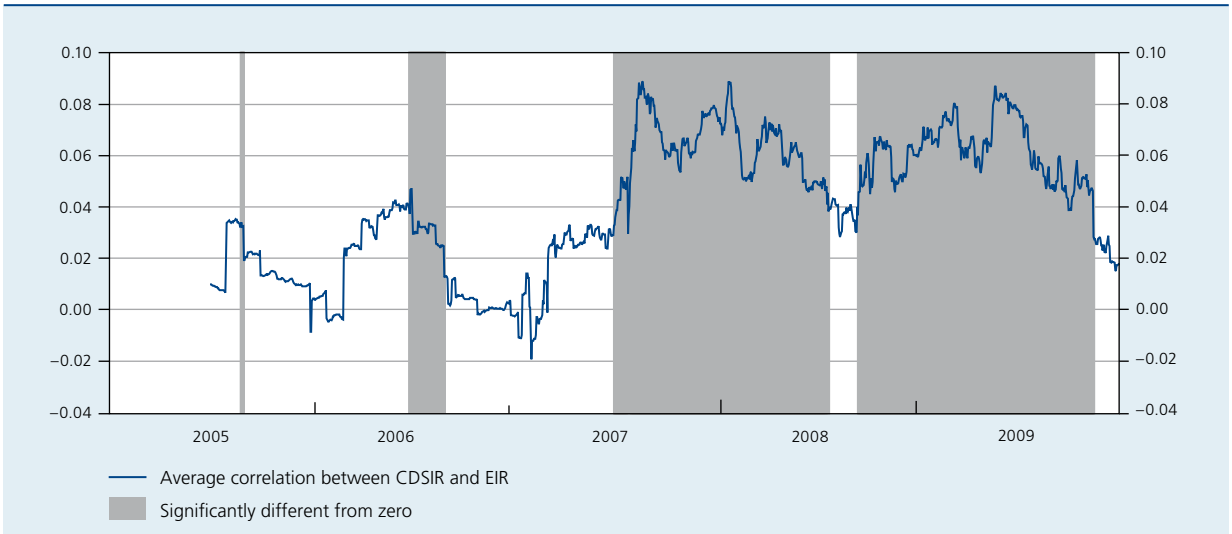
The period before the crisis, up to October 2006, is the period where average EIRs were closing the gap with average CDSIRs, similarly to equity prices versus CDS spreads. Interestingly, as can be observed from Chart A1 in the appendix, the other periods where the different behaviour of EIRs and CDSIRs is statistically significant (August 2008; October 2008-December 2008; early 2009) correspond to periods in which the movements in equity prices and CDS spreads for the banks in our sample diverge the most. For instance, the period after the collapse of Lehman Brothers in September 2008, was characterized by several standalone support actions for large individual institutions, both in Europe and the US. As more and more financial institutions became affected by the crisis, many countries announced comprehensive rescue packages involving some combination of recapitalizations, debt guarantees and asset purchases.

3.2 Rolling correlations between CDSIR and EIR

In this section we provide an analysis of correlations between CDSIRs and EIRs. More specifically, we look at six-month rolling correlations between daily changes in these variables.[1] We analyze correlations in changes in the MIRs rather than in the rating levels since results are qualitatively similar but the graphs and the interpretation of the results for changes are clearer. In particular, we expect the correlation between changes in CDSIRs and changes in EIRs to be positive, as increases (decreases) in both ratings should signal an improvement (a deterioration) in the creditworthiness of issuers.

(1) The six-month rolling correlations are calculated as follows: for each bank the correlation between the changes in the variables is calculated over a window period of six months and the calculation is then repeated by moving ahead the sample period of an increment of one day. This means that for each six-month period after the first one, the earliest observation is dropped from the calculation and the most recent one is added in, again to have a correlation over six months. Rolling analysis is commonly used in time series analysis to assess the stability of a certain relationship over time.

CHART 3 AVERAGE SIX-MONTH ROLLING CORRELATION BETWEEN CDSIR AND EIR FOR SAMPLE OF 30 BANKS



Sources : Own calculations based on data from Moody's.

Chart 3 plots the daily average across banks of the six-month rolling correlations between changes in CDSIR and changes in EIR, calculated for each bank. The grey area indicates periods for which these averages of six-month correlations are significantly different from zero. Given that changes in the CDSIR and the EIR for a given bank should move in the same direction, we would expect the correlation of changes to be positive. A first observation from the chart is that the correlation between the two series is rather low, ranging from about –0.02 to 0.09. A likely reason for this is that we look at correlations between daily changes in CDSIRs and EIRs; as MIRs change with a relatively low frequency (see Section 1.1), the correlation between daily changes cannot be expected to be high. A check of the correlations of weekly changes in CDSIRs and EIRs indeed yields correlations that are somewhat higher, though still far from 1 (ranging between –0.10 and 0.20).

A second observation from the chart is that there is significant time-variation in the correlations between changes in CDSIRs and EIRs.[1] In particular, whereas until July 2007 the correlation was not significantly different from zero most of the time, at the beginning of the crisis, in the summer of 2007, the average correlation increased significantly. During almost the entire crisis period, this correlation remains at this higher level (around 0.07). As the grey area indicates, the correlation is significantly different from zero from July 2007 up to August 2008 and in the crisis period following government interventions (from October 2008). Interestingly, the correlation between changes in CDSIRs and EIRs is not significantly different from zero during September 2008; the many crisis events during this month appear to have increased the variation in the signals provided by the two indicators. This correlation then increases and, towards the end of our sample period, seems to revert back to the lower pre-crisis levels.

3.3 Rolling correlations between MIRs and CDS spread

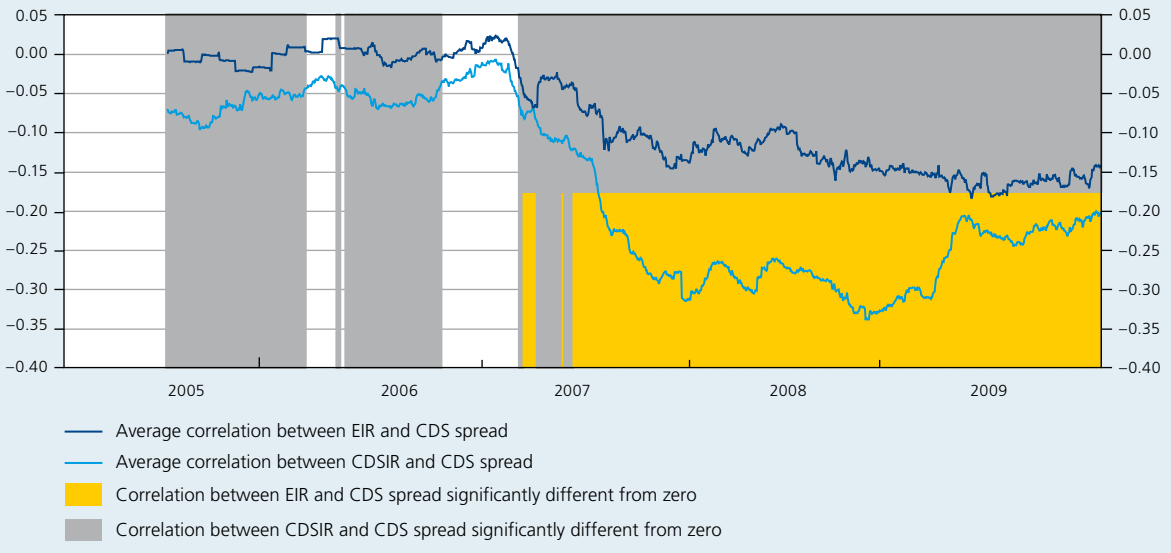
Finally, we also consider the six-month correlations between changes in the two types of MIRs and CDS spreads. We expect a negative correlation between MIRs changes and CDS spread changes, as higher CDS spreads are associated with higher credit risk.

Chart 4 plots the average six-month rolling correlations between daily changes in CDSIRs and changes in CDS spreads, and between changes in EIRs and changes in CDS spreads. The grey and yellow areas indicate periods when the correlations are significantly different from zero.

The chart reveals that prior to the crisis (up until April 2007), the correlations between the changes in the two types of MIRs and the changes in CDS spreads were

(1) This is also true for weekly correlations.

CHART 4 AVERAGE SIX-MONTH ROLLING CORRELATIONS BETWEEN MIRs AND CDS SPREAD FOR SAMPLE OF 30 BANKS



Source: Own calculations based on data from Moody's and Datastream.

substantially lower than during the crisis period. In particular, the correlations between CDSIR changes and CDS spread changes fluctuated between 0 and –0.10 before the crisis. As observed in the discussion of Chart 1 in Section 2.1, CDS spreads and CDSIRs were quite stable from 2005 to April 2007, which may explain the lower correlation in the pre-crisis period. Then, the correlations between changes in CDSIRs and CDS spreads fell to a level around –0.30 during the crisis. From March 2009 onwards, the correlations between changes in CDSIRs and changes in CDS spreads are more or less stable around –0.20.

As for the corresponding correlations between EIR and CDS spreads, Chart 4 shows that the changes in these two credit risk measures were in fact uncorrelated (not significantly different from zero) before the crisis. During the crisis, the correlations dropped to significant levels between –0.10 and –0.20. Overall, the correlations between EIR changes and CDS spread changes were lower (in absolute value) than those between changes in CDSIRs and CDS spreads over the entire sample period. (1)

(1) The corresponding correlations in weekly rather than daily changes range between –0.20 and –0.60 for CDS spreads and CDSIRs, and between 0 and –0.30 for CDS spreads and EIRs. Daily changes therefore result in lower correlations, but qualitative results are again similar for weekly changes.

(2) Studies from the academia and rating agencies show that while the CDS market leads the bond market, the evidence on the lead-lag relationships between the CDS and equity markets is inconclusive.

The low values of the correlations in the contemporaneous changes between MIRs and between the changes in MIRs and CDS spreads suggest that one or more of these series may be leading the others. We investigate this question in the next section.

4. Dynamic lead-lag relationship

In this section we provide a preliminary analysis of dynamic relationships between the MIRs and CDS spreads. We are interested in knowing whether there are strong relationships between lagged changes in the variables and whether one indicator may be leading the others. For example, a finding that one of the indicators systematically moves ahead of the others could be interesting with respect to early detection of financial distress. (2) Since MIRs are constructed in a way that combines the issuers' information from long-term ratings and from the markets, it is likely that CDS spreads lead changes in the implied ratings. However, the possibility of changes in MIRs leading credit spreads cannot be ruled out completely. In particular, as explained above, MIRs are relative measures of credit risk. This implies that a bank's MIR can change before its market underlying market price does for at least two reasons. First, for given long-term ratings of the firms in the reference sample used to construct the MIRs, a strong movement in the (credit risk information obtained from) market prices of (a substantial number of) other firms in

TABLE 2 GRANGER-CAUSALITY TEST RESULTS

(1)	(2)	(1) causes (2)	(2) causes (1)	Bi-lateral causality	No causality link
Whole period: 1 January 2005 – 31 December 2009					
CDS spreads	CDSIR	16	3	9	2
CDS spreads	EIR	6	6	3	15
CDSIR	EIR	0	3	0	27
Pre-crisis period: 1 January 2005 – 31 July 2007					
CDS spreads	CDSIR	5	3	18	4
CDS spreads	EIR	3	3	3	21
CDSIR	EIR	4	4	0	22
Crisis period: 1 August 2007 – 31 December 2009					
CDS spreads	CDSIR	18	2	7	3
CDS spreads	EIR	6	6	0	18
CDSIR	EIR	1	0	1	28

Notes: This table reports the Granger-causality test results of the VAR analysis. The first two columns of the table indicate the number of sample banks for which the hypothesis that one credit risk indicator Granger causes the other cannot be rejected at the 5 p.c. significance level. The third and fourth columns indicate respectively the number of cases in which a bi-lateral causality link and no causality link between the credit risk indicators in question are detected.

the sample may cause a change in the bank's MIR, even if its own market price did not change. Second, for given (credit risk information obtained from) market prices of the firms in the reference sample used to construct the MIRs, a change in the long-term ratings of (a substantial number of) other firms in the reference sample may change the bank's MIR without a change in its underlying market price. Hence, the combination of different information sources (long-term ratings and credit risk information obtained from market prices) into a relative measure of credit risk may explain why the MIRs of our sample banks may move earlier than the underlying market prices do.

To shed light on this issue, we perform a Granger causality tests to check whether lagged values of one variable help to predict the other variables by running a simple vector auto-regression (VAR) for each bank separately. More precisely, a VAR is a linear model of n-equations, n-variables (n=3 in our case). In this system, each variable is explained by its own lagged values, plus the current and past values of the other n-1 variables. The explicit VAR specification used in this analysis expresses each variable as a linear function of its own past values, the past values of all other variables and a serially uncorrelated error term.[1] Hence, this specification allows to capture the lead-lag relationship between CDS spreads, CDSIRs and EIRs. The Granger causality test corresponds to testing whether the relevant sets of coefficients are zero. For example, if EIRs help to predict CDS spreads, then the coefficients on the lags of EIRs will be significantly different from zero in the equation of the VAR system where CDS spreads are the dependent variable.

Table 2 summarizes the Granger-causality test results. In particular, the first two columns report the number of banks in our sample of 30 banks, for which the hypothesis that one indicator Granger-causes the other cannot be rejected at 5 p.c. level of significance. The third column reports the number of banks for which the causality between two indicators is running both ways, i.e. for which a significant non-contemporaneous relationship exists but the direction of causation runs in both ways.[2] The last column reports the number of banks for which there is no Granger-causality link between the indicators considered, i.e. no significant non-contemporaneous relationship can be detected for these banks.

(1) For each bank, we use 5 daily lags for each variable in the equations. The results do not vary significantly if we use a specification where, for each bank, the number of lags is selected using the Bayesian information criterion, which selects the best fitting model, that is the best number of lags to be estimated for each bank.

(2) In this case, the results are hard to interpret and further analysis is required. It could be that the series are driven by a common third process at different lags.

This table reveals that for a majority of the banks in our sample there is a significant non-contemporaneous relationship between changes in CDS spreads and changes in CDSIRs. Given that CDSIRs are derived from CDS spreads and long-term ratings, this may not seem very surprising. In contrast, there is only weak evidence for relationships between CDS spread changes and EIR changes, and no significant relationship between these variables for more than half of the banks in our sample. Finally, there appears to be virtually no non-contemporaneous relationship between CDSIR changes and EIR changes.

Turning to the direction of causality in those relationships found to be significant, we find that CDS spreads are quite often leading CDSIRs, especially during the crisis period. This implies that during the crisis, CDS spreads were signalling credit risk (or other factors, such as increased investors' risk aversion) earlier than CDSIRs did. With respect to changes in CDS spreads and changes in EIRs, Table 2 shows that the number of banks for which the former is leading the latter always equals the number of banks for which the opposite is true. Finally, for the very few banks that have a significant non-contemporaneous relationship between changes in CDSIRs and changes in EIRs, we find no clear direction in which indicator is leading the other.

Overall, these observations suggest that differences in the movement of CDSIRs and EIRs discussed in Sections 2 and 3 cannot be explained by some difference in the timing with which MIRs reflect the market information on individual credit risk.

5. Concluding remarks

In the past decade there has been an increasing focus on financial instability and its early detection as an input to policy decisions. The recent financial crisis, its high costs and the importance of macro-financial factors has revealed the need to strengthen macro-prudential supervision. One of the objectives of macro-prudential supervision is to monitor the cyclical and structural trends in financial markets so as to identify signals and measures of potential vulnerabilities in the financial system in a timely manner. Hence, a related policy question is what instruments or variables might constitute reliable indicators of emerging risks.

Market-implied ratings have been recently introduced by rating agencies as indicators of credit risk that include information on credit risk from the market, but are more stable than prices and are based on a scale (the traditional rating scale) which can be easily understood. For these reasons, market-implied ratings appear

to be used by central banks, financial institutions and investors as a complement to long-term ratings and market prices to monitor the financial condition of banks. From a macro-prudential point of view, it is interesting to ask whether such indicators offer a more precise measure of credit risk than e.g. CDS spreads, and whether information about credit risk is incorporated into one of the market-implied ratings (CDS-implied or equity-implied) more quickly than in the other or than in market prices (CDS spreads).

This article addresses these questions by analysing the behaviour of market-implied ratings over a period covering the run-up to the crisis and the crisis period itself. The available evidence seems to suggest that MIRs are unlikely to fully overcome the deficiencies of their underlying components (long-term ratings and market prices). In particular, the behaviour of MIRs obtained from the CDS market and those obtained from the equity market does not always coincide. That is, the relationship between CDSIRs and EIRs is time-varying. In addition, the two types of MIRs also seem to differ somewhat in their relationship to CDS spreads. Correlations between changes in CDSIRs and EIRs are low, and there seems to be no lead-lag relationship between the changes in these variables, suggesting that the low correlations are not due to differences in the speeds at which CDS and equity markets reflect information relating to credit risk.

Instead, the movements in CDSIRs and EIRs seem to reflect movements in the underlying prices in CDS and equity markets, although these movements may not be driven only by factors related to credit risk.

This article represents a first step in analyzing the behaviour of MIRs and suggests several avenues for further research. A natural question which arises from the results is what drives the seemingly unrelated movements sometimes observed in the MIRs. Is the main driver increased credit risk? Are there methodological reasons suggesting that MIRs should not be expected to offer equivalent measures of credit risk? To what extent do factors unrelated to credit risk, such as risk premia, liquidity premia, or bank-specific characteristics affect the MIRs?

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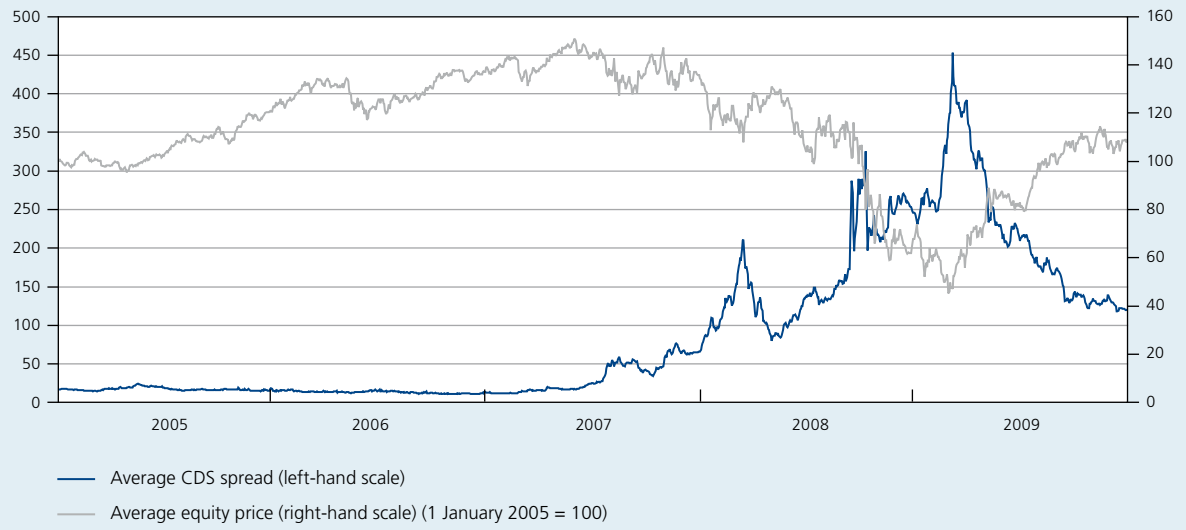
Appendix

CHART A1 HISTORICAL EVOLUTION OF AVERAGE CDS SPREAD AND AVERAGE EQUITY PRICE OVER THE PERIOD 1 JANUARY 2005 – 31 DECEMBER 2009



Source : Own calculations based on data from Datastream.

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