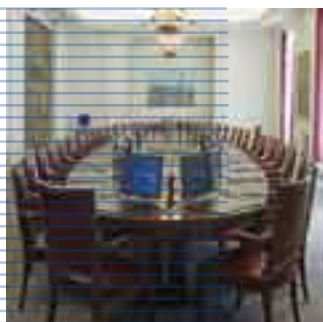


Financial Stability Review 2006



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The Financial Stability Review is the fruit 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



In the last twelve months, the financial system has been operating in an environment conducive to financial stability. World economic growth has been sustained, and the number of borrowers facing repayment difficulties has been limited, translating into low credit risk premia. Credit institutions have enjoyed strong profitability, which has further strengthened the sector's capacity to withstand future shocks.

However, those positive results, which have also been observed in Belgium, need to be put into perspective. On the one hand, the current level of profitability largely depends on the favourable cyclical conditions. An economic downturn or protracted turbulence in stock markets would affect banks' revenues through changes in credit volumes or in the level of fees and commissions from market activities. It would also influence costs, as loan losses tend to increase during a recession. On the other hand, financial markets are becoming increasingly "contestable". Rapidly evolving products and changes in the nature of financial services, against the backdrop of European integration, mean that credit institutions can no longer take it for granted that their strong historical position in specific markets will provide a stable profit. As a consequence, most financial intermediaries are developing new activities or penetrating markets in other countries. While these moves constitute a welcome source of diversification of income, they also entail potential strategic risks and, at the same time, step up the general level of competition in the financial system.

Though the financial sector is currently resilient, the changes in the nature of activities will present challenges in the medium or long term. This was one of the important factors highlighted by the IMF during the recent Financial Sector Assessment Program (FSAP) mission conducted in Belgium. In its conclusions, the IMF emphasises the positive track record of financial stability in Belgium. This robustness is backed by a number of specific features, such as access to the large reservoir of national savings, a traditionally cautious attitude by banks towards risk, and the large proportion of prime quality debtors – especially public authorities – in credit portfolios. The overall soundness of the financial intermediaries has been confirmed by the results of stress tests run by the main financial institutions and by the National Bank of Belgium (NBB) and the Banking, Finance and Insurance Commission (CBFA), in coordination with the IMF.

For the longer term, increased cross-border operations and closer links to the global money centres, while offering potential for diversification, expose financial institutions to business risks that could become more apparent with a downturn in the business cycle. Nevertheless, the IMF considers that the banks are well able to manage those risks, both on the international level and domestically. Furthermore, the authorities in charge of supervision and oversight have a good understanding of the risks, and largely comply with internationally accepted standards and codes. The IMF also welcomes the move towards a unified supervisory agency, and emphasises the need to take fuller advantage of the synergies between the CBFA and the NBB.

The development of these synergies has been coordinated by the Financial Stability Committee (FSC) which brings together, under my chairmanship, the members of the boards of the CBFA and the NBB. Activities have been centred on two main areas. In the field of support activities, the FSC has identified and ensured the follow-up of the various tasks which are to be performed in common by both institutions, such as the processing of the information supplied by financial institutions, information technology or facilities and general services. Moreover, synergies are pursued in key core activities on which the two institutions endeavour to collaborate closely. Each of the four major areas concerned by this cooperative approach is addressed in this FSR.

The FSR begins with a general overview of financial stability conditions, which represents a part of the NBB's contribution to the monitoring of the Belgian financial system. This macroprudential analysis, focusing on the likelihood of the emergence of systemic risks, differs from the more microprudential surveillance conducted by the CBFA. Where the NBB tries to detect global trends and channels of contagion, the CBFA concentrates on the financial resilience of individual institutions. Nevertheless, the two approaches are complementary and need to be combined to arrive at a comprehensive assessment of the financial system.

A second area of cooperation concerns the surveillance of large financial infrastructures. The importance attached by the NBB to the smooth functioning of payment, clearing and settlement systems has crystallised in the development of a specific oversight activity. Important features of this activity are examined in a specific section of the FSR, devoted to the resilience of the financial infrastructure. The oversight mission of the NBB gains special significance when it applies to major cross-border infrastructures located in Belgium, i.e. SWIFT and Euroclear.

For the latter institution, the oversight needs to be coordinated with supervision, by the CBFA, of Euroclear Group. One of the main recommendations of the IMF FSAP was to enhance the resources and capacity focused on the oversight and prudential supervision of the systemically important Euroclear system, and to further strengthen cooperation in this area between the NBB and the CBFA.

A third important field of coordination is crisis management. The first thematic article in the third section of the FSR explores the special issues that institutions providing services in several EU countries raise for the management of banking crises. This article clearly shows that the relationship between the NBB and the CBFA must be part of a wider multinational network, as the growing integration of financial markets and systems increasingly calls for an efficient cross-border surveillance structure.

The preservation of financial stability not only calls for a strong surveillance system and adequate crisis management arrangements but it also rests on a set of rules and standards designed to prevent any weakening of the resilience of the financial system. Nowadays, this regulatory framework is generally formulated at an international level. The NBB and the CBFA closely

coordinate their participation in the work of the various international organisations and forums where this preparation takes place. This cooperation ensures a more efficient use of limited resources, and it also helps to combine operational experience with more conceptual and analytical skills needed for such a task. In this spirit, the last two articles address issues raised by the implementation of capital requirements in the banking sector and the insurance sector respectively.

Brussels, June 2006

Executive summary

1. Overview

The turbulence in global stock and commodity markets in May 2006⁽¹⁾ interrupted a prolonged period of very tranquil conditions on global financial markets. Against the backdrop of strong and increasingly broad-based global economic growth, the withdrawal of monetary policy accommodation in the US, the euro area and Japan had led to a rise in long-term interest rates during the preceding months, but without a significant detrimental effect on investors' appetite for risk or on volatilities and risk premiums. More recently, global financial markets have been affected by uncertainty over the outlook for inflation. They nevertheless continue to benefit from the corporate sector's high profitability and much-improved financial health after years of balance sheet restructuring. Following a spike of credit risk premiums in the spring of 2005, spreads on investment- and speculative-grade corporate bonds have remained close to the low levels that were reached at the beginning of last year – in line with the global issuer-weighted default rate on speculative-grade bonds, which dropped in the first quarter of 2006 to its lowest level in nearly 10 years.

While the recent events are a reminder that the operating environment for financial institutions in the coming quarters may be less favourable, it should also be noted that the past twelve months have witnessed the first signs of a reversal in the corporate credit cycle. After years of spending restraint and balance sheet repair, the main focus of US and European corporations has indeed shifted back towards shareholder-friendly uses of cash flows, such as increased dividends and equity buy-backs, and more expansionary strategies in terms of capital expenditures and mergers and acquisitions.

This has contributed to a resumption of corporate borrowing from markets and financial institutions in the US and the euro area and a deterioration in the balance between the number of up- and downgrades of corporate bonds, which traditionally have been leading indicators of a turnaround in corporate default rates and higher credit losses.

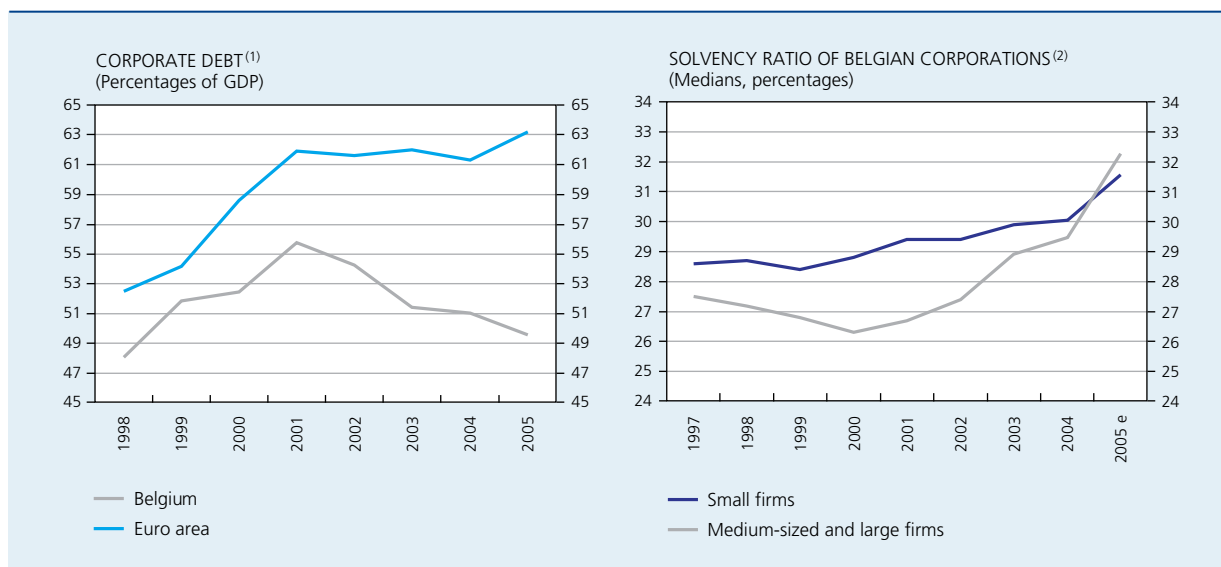
1.1 Private sector

In Belgium, the non-financial corporate sector's net recourse to debt financing remained very limited in 2005. This development reflected, in the first place, a very modest need for external financing as a result of strong internal cash flows and a significant reduction of investments in financial assets. The external financing requirement amounted to only 1.7 p.c. of GDP last year – versus an earlier peak of more than 15 p.c. in 2000 – and was mainly met through issues of quoted and unquoted equity. As a result, the indebtedness of the non-financial corporate sector in Belgium declined to 49.6 p.c. of GDP in 2005 (Chart 1, left-hand panel). This is 6.2 percentage points lower than in 2001, and significantly below the corresponding level for the euro area, where the indebtedness of the corporate sector has started to increase again, after having been stable at around 62 p.c. of GDP between 2001 and 2004.

The continued focus of the Belgian non-financial corporate sector on de-leveraging is also evident in the solvency ratios of small companies and medium-sized and large firms (Chart 1, right-hand panel). They both showed significant increases last year, which may partly have been related to a fiscal incentive. A change in the corporate tax regime will henceforth allow corporations to deduct from their taxable corporate earnings a notional interest expense related to the size of their own funds. While contributing to a decline in corporate default rates in 2005,

(1) The analysis in the Overview article is based upon information and data available as at 15 May 2006.

CHART 1 NON-FINANCIAL CORPORATE SECTOR DEBT



Sources: ECB, NBB.

(1) Debt includes loans granted by euro area monetary financial institutions and other financial institutions, debt securities and pension fund reserves.

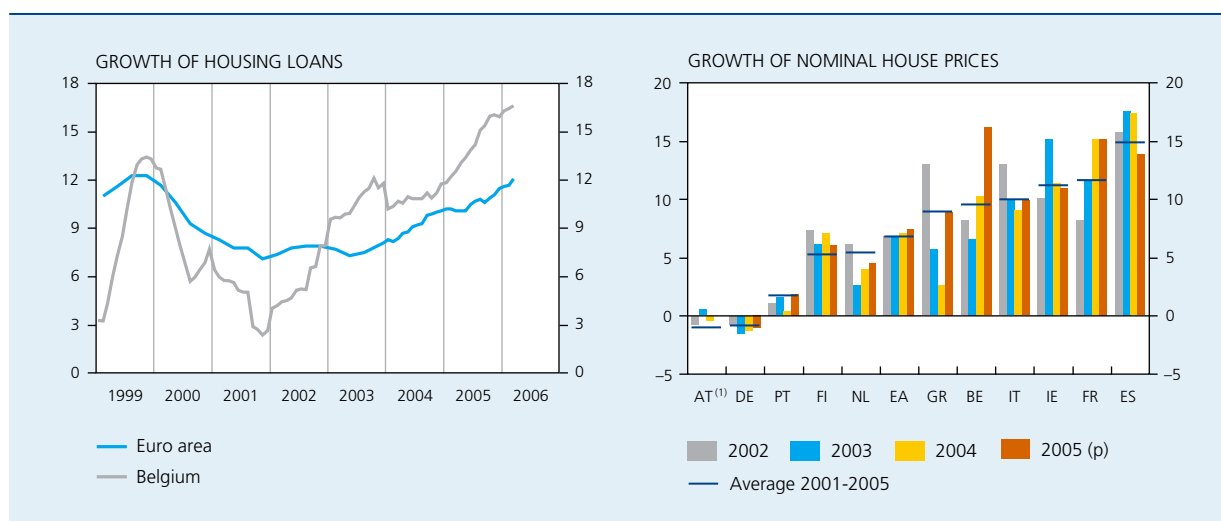
(2) The solvency ratio is calculated as own funds divided by the balance sheet total. The medians in 2005 are calculated by applying to the 2004 medians of the whole population the percentage of variation observed in a constant sample of early reporters in the Central Balance Sheet Office. A company is considered to be small when it submits its annual accounts to the Central Balance Sheet Office in accordance with the abbreviated reporting scheme. Medium-sized and large companies report in accordance with the full scheme.

the stronger solvency position of Belgian non-financial corporations has also led to an improvement in the frequency distribution of individually-estimated corporate bankruptcy probabilities.

The de-leveraging operated by Belgian non-financial corporations in recent years contrasts sharply with the substantial mortgage borrowing of Belgian households, which lifted their overall indebtedness to a new peak of 43.1 p.c. of GDP in 2005, versus 28.1 p.c. 20 years

CHART 2 MORTGAGE AND HOUSING MARKET DEVELOPMENTS IN BELGIUM AND THE EURO AREA

(Percentage changes compared to the corresponding period of the previous year)



Sources: ECB, Stadim, NBB.

(1) Average 2001-2004 in the case of Austria.

ago. The growth of housing loans accelerated during the period under review to above 16 p.c. year-on-year, *i.e.* some 4.5 percentage points in excess of the equivalent figure for the euro area (Chart 2, left-hand panel). House prices also continued to grow at a rapid pace. Following a growth rate of 10 p.c. in 2004, the average selling price of houses in Belgium increased last year by an additional 16 p.c., putting Belgium into the group of euro area countries where the average annual rate of house price inflation over the past five years has been (close to) a double-digit figure (Chart 2, right-hand panel).

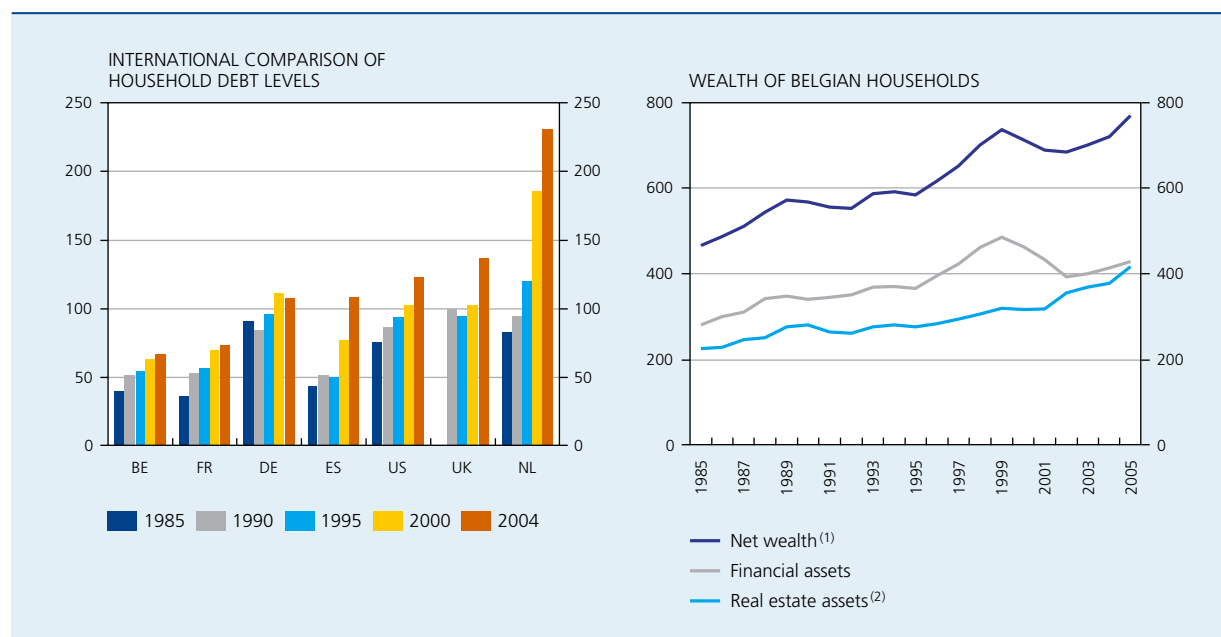
Although the overall indebtedness of the Belgian household sector remains quite limited in comparison with the corresponding levels recorded in other countries, or with the value of the Belgian household sector's real and financial assets (Chart 3), these aggregate indicators of the debt burden of Belgian households can only be very crude yardsticks to assess their degree of indebtedness and the related risks.

Given the still significant differences between national markets for household lending, a comparison of Belgian households' gross aggregate debt with that in the Netherlands, for example, should make allowance for

the fact that the comparatively high debt ratio in the Netherlands is in part a reflection of the generous tax treatment of mortgage-related interest payments, which encourages Dutch households to repay the principal on their loan at maturity with funds accumulated over time in fixed interest savings or equity accounts. In a similar vein, differences in the typical maturity of mortgage loans – which ranges from 15 to 20 years in Belgium and France to 20 to 30 years (or more) in Germany, the Netherlands or the UK – can also explain international differences in the average indebtedness of mortgage borrowers, without resulting in a corresponding divergence in the annual debt service burden for households.

The net wealth of the Belgian household sector in aggregate – which has risen to a new peak in 2005 – also says nothing about the distribution of debt and assets within this sector, and the corresponding balance sheet fragilities of different cohorts within the population of households. Such detailed microeconomic information on the financial position of Belgian households is not available. The very strong increase in the average amount of new mortgage loans since 1995, which cannot be explained solely on the basis of the positive impact of rising disposable income and lower mortgage rates on households'

CHART 3 FINANCIAL POSITION OF THE HOUSEHOLD SECTOR
(Percentages of household disposable income)

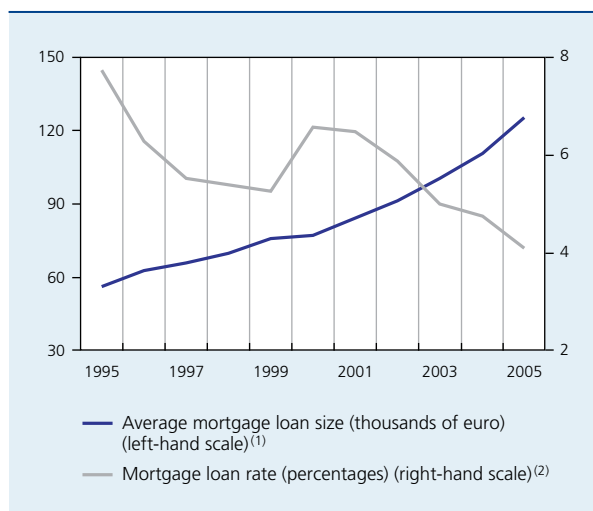


Sources: CGFS, NSI, Rademaekers and Vuchelen (1998), Stadim, NBB.

(1) Net wealth is the difference between the real and financial assets held by households and their liabilities.

(2) For the years up to 1997, the stock of households' real estate assets, at market value, was taken from Rademaekers and Vuchelen (1998) "Het Belgische gezinsvermogen 1992-'97", Bulletin de documentation/Documentatieblad, Federal Public Service Finance. Figures as from 1998 are obtained by applying the annual price and volume changes for the different categories of real estate assets to the 1997 figure.

CHART 4 AVERAGE SIZE OF NEW MORTGAGE LOANS AND MORTGAGE LOAN RATE



Source: NBB.

(1) Mortgage loans for the purchase of an existing home.

(2) Annual averages.

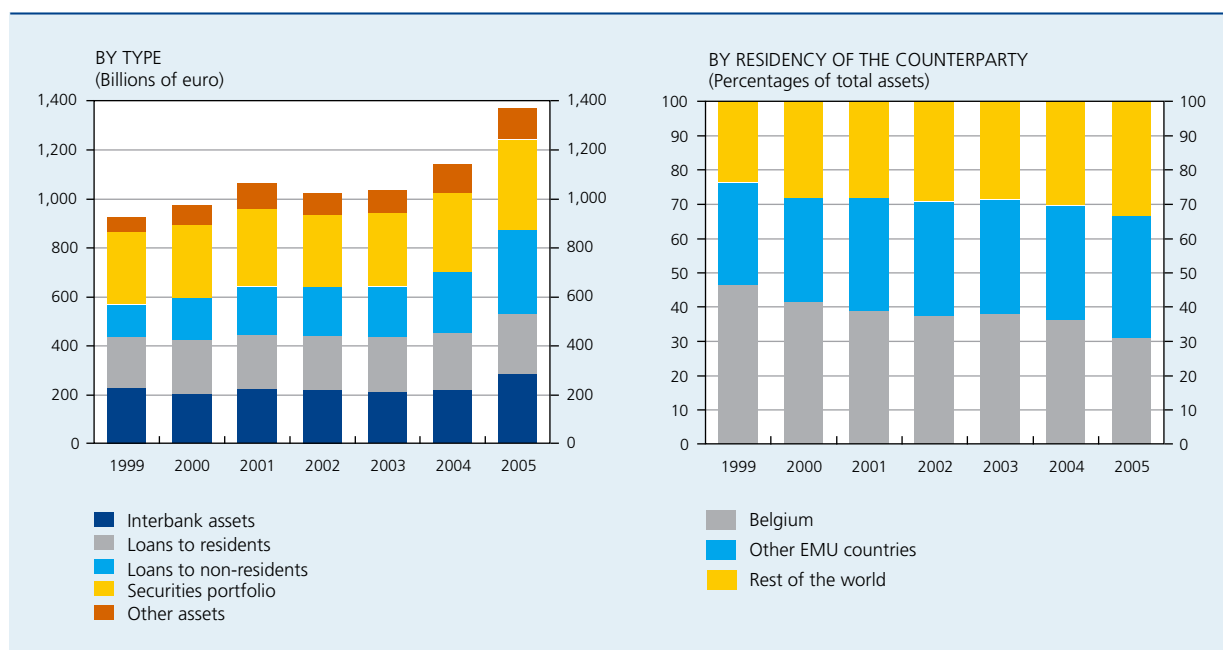
borrowing capacity, nevertheless suggests in this connection that the average annual debt service and/or maturity of new mortgage loans has recently increased (Chart 4). Such a trend towards a higher mortgage debt burden

may, at the margin, lead to a future increase in the annual mortgage loan default rate, which amounted to a low 0.24 p.c. in 2005.

1.2 Banking sector

The strong growth of mortgage loans in Belgium has been one of the factors contributing to a sharp expansion of the Belgian banking sector's aggregate balance sheet between the end of 2003 and the end of 2005 (Chart 5, left-hand panel). Other notable sources of growth were higher interbank assets and loans to non-residents. As concerns the latter, their steady rise is part of a trend towards increasing internationalisation of Belgian banks. At the end of 2005, the share of claims on residents in Belgian banks' total assets had dropped to 30.9 p.c., with claims on counterparties residing in other EMU countries and the rest of the world each representing about one third of Belgian banks' total assets (Chart 5, right-hand panel). Limited growth opportunities in the Belgian banking market have increasingly induced Belgian banks to develop their activities abroad, including in Central Europe and Turkey. The bulk of Belgian banks' foreign exposures, however, still consists of claims on counterparties in other EMU and developed countries, such as Germany, France, the Netherlands, Italy, the UK and the US.

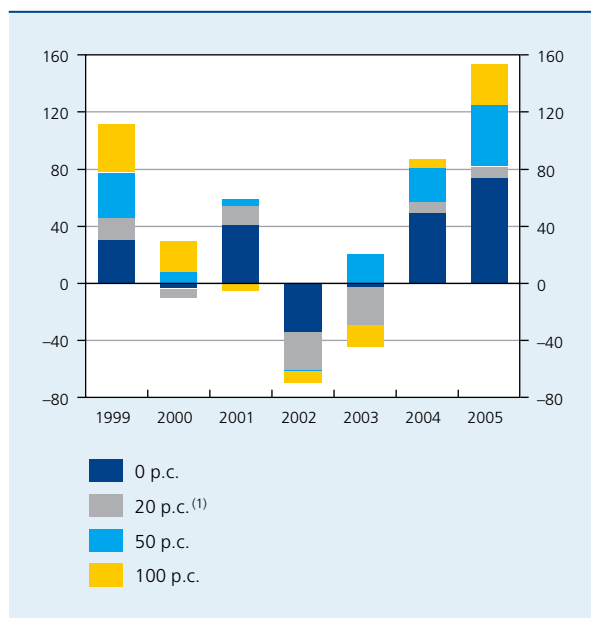
CHART 5 BREAKDOWN OF BELGIAN BANKS' ASSETS
(End of year consolidated figures)



Sources: CBFA, NBB.

CHART 6 CHANGE IN ASSETS OF CREDIT INSTITUTIONS UNDER BELGIAN LAW ACCORDING TO THE BASEL I RISK WEIGHT COEFFICIENTS FOR CREDIT RISK REQUIREMENTS

(Consolidated figures, end of year changes, billions of euro)



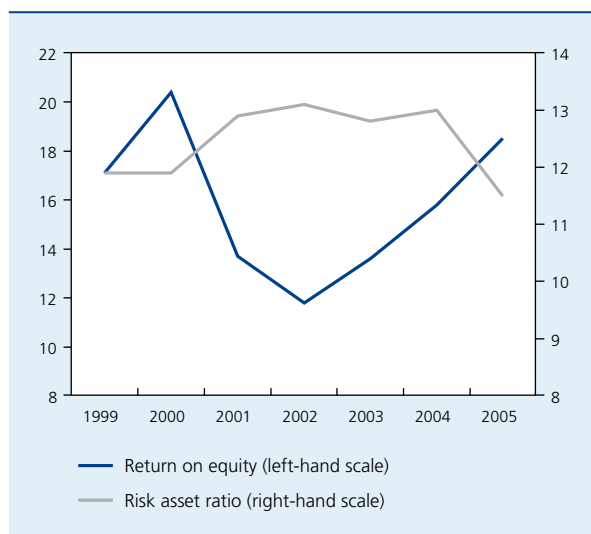
Sources: CBFA, NBB.

(1) Including the risk classes with a risk weight factor of 4 and 10 p.c.

If the growth of total assets since 2003 is broken down into the Basel I risk weight classes for credit risk, which are – admittedly crude – measures of their underlying

CHART 7 RETURN ON EQUITY AND RISK ASSET RATIO OF CREDIT INSTITUTIONS UNDER BELGIAN LAW

(Consolidated figures, percentages)



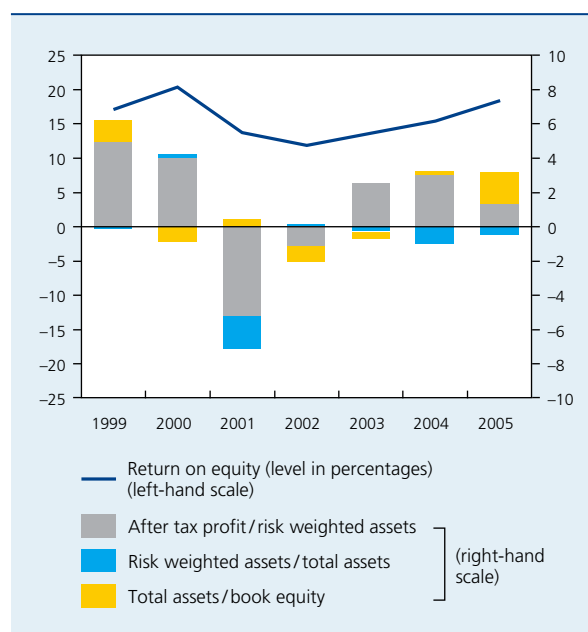
Sources: CBFA, NBB.

riskiness, it appears that most of the growth occurred in the 0 p.c. and 50 p.c. risk weight classes (Chart 6). While the 0 p.c. risk class comprises low-risk claims on the public sector and claims guaranteed by government bonds (such as secured interbank loans), the 50 p.c. risk class consists mainly of mortgage loans. Growth in the class with a 100 p.c. risk weight – which includes the majority of loans extended to corporations – was more moderate, but followed a three-year period during which the outstanding amount of these claims had declined. Overall, the expansion of Belgian banks' assets since 2003 was thus mainly concentrated in assets with a low or moderate credit risk profile. Given the amounts involved, the capital requirements for credit risk, which are still the major component of Belgian banks' total capital requirements under Basel I, nonetheless increased strongly in 2005, contributing to a decline in the risk asset ratio from 13 p.c. at the end of 2004 to 11.5 p.c. at the end of 2005 (Chart 7).

Belgian banks' return on equity rose from 15.8 p.c. in 2004 to 18.5 p.c. in 2005. As indicated in Chart 8, the change in the return on equity can in fact be broken down into three factors, *i.e.* changes in the risk adjusted return on assets, changes in the riskiness of assets, and changes in financial leverage. The latter was the main driver behind the increase in the return on equity, as the

CHART 8 BREAKDOWN OF CHANGES IN THE RETURN ON EQUITY OF CREDIT INSTITUTIONS UNDER BELGIAN LAW

(Consolidated figures, percentage contributions to changes in the return on equity, unless otherwise stated)



Sources: CBFA, NBB.

growth of total assets far exceeded the rise in banks' book equity. A strong rise in after tax profits, relative to the growth of risk weighted assets, also contributed positively, helped by historically low provisions for credit losses.

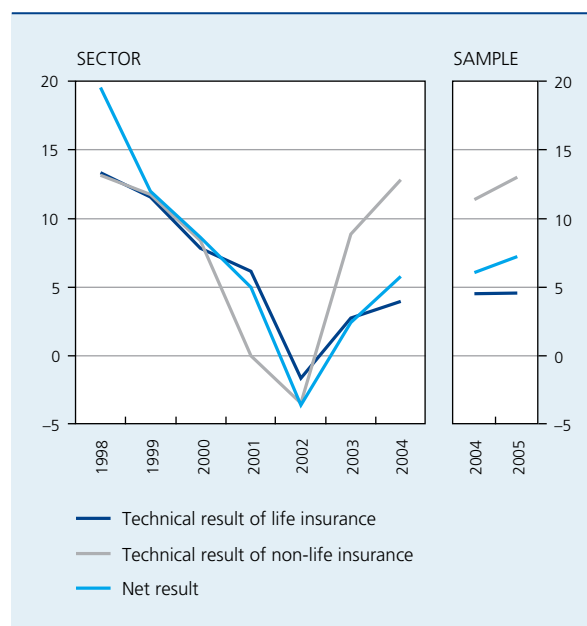
The last factor, which corresponds to the average riskiness of Belgian banks' assets, contributed negatively to the return on equity in 2005. This factor has on average had a negative impact on changes in the return on equity since 1999, as it declined during this period from 43.9 p.c. to 35.5 p.c. in 2005. While those relatively low percentages are subject to the shortcomings of Basel I – which is a much less sensitive measure of credit risk than the new framework introduced by Basel II —, they nonetheless illustrate a key characteristic of the Belgian banking sector, *i.e.* a large proportion of low-risk assets on the balance sheet. This specific feature contributes to the resilience of the Belgian banking sector and helps to underpin stability, as emphasised by the IMF in its recent Financial Sector Assessment Program (FSAP) for Belgium. However, those low-risk assets also weigh on banks' return on equity, leading credit institutions to diversify into more profitable but also potentially more risky activities.

1.3 Insurance companies

The profitability of Belgian insurance companies further improved in 2005 (Chart 9). Profits increased substantially more in life insurance than in non-life insurance, but this difference was largely related to the fact that premium growth in life was exceptionally strong last year. Expressed as a percentage of collected premiums, profitability in life insurance remained stable, whereas in non-life insurance, the result further improved to its highest level since 1998. The total net result, which also includes the financial results that have not been attributed to life or non-life activities, as well as exceptional items and taxes, increased from 6.0 to 7.2 p.c. of total collected premiums. While this is still lower than the high levels achieved at the end of the nineties, Belgian insurance companies' profitability thus pursued its gradual recovery from the low point in 2002.

Notwithstanding the strong growth in class 23 (unit-linked) contracts, premiums collected in life insurance still mostly concern class 21 products, on which insurance companies guarantee a minimum rate of return. In Belgium, the legal maximum for this guaranteed rate of return is currently 3.75 p.c., which is a high level in comparison with other EU countries (Chart 10). In practice, however, the guaranteed rates applied by Belgian insurance companies to new contracts have been below this legal ceiling in recent years. This change in market prac-

CHART 9 RESULTS OF BELGIAN INSURANCE COMPANIES
(Percentages of collected premiums⁽¹⁾)



Sources : CBFA, NBB.

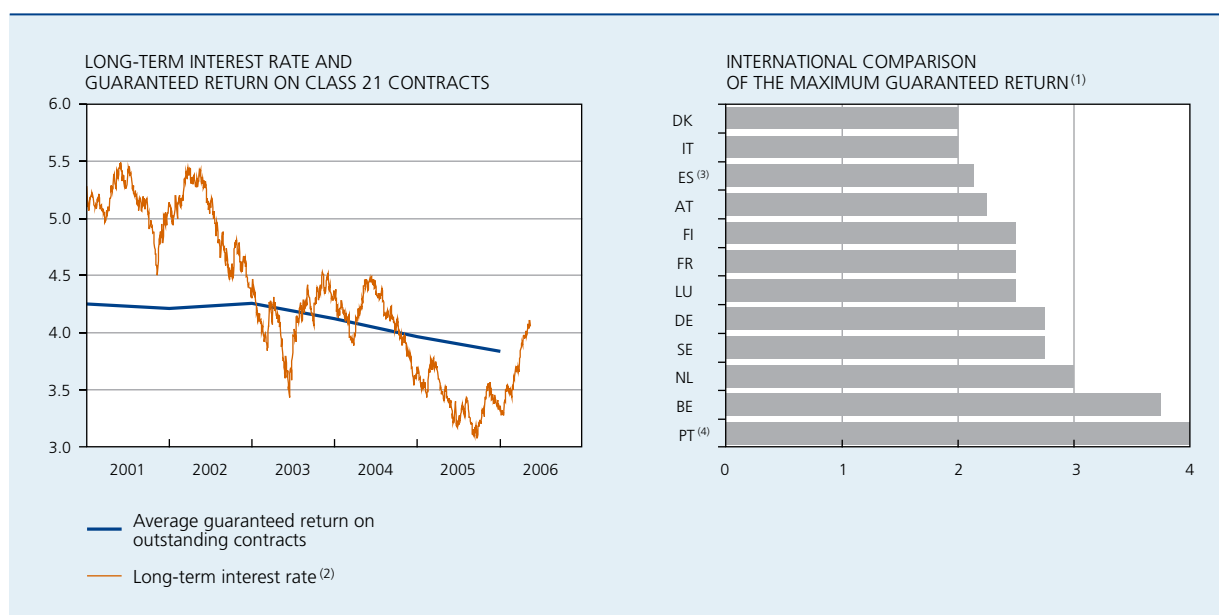
(1) Life insurance premiums for life insurance activities, non-life insurance premiums for non-life activities and all premiums for the net result.

tice was prompted by the losses experienced on insurance companies' equity portfolios in the period 2000-2002 and the decline of long-term interest rates to historically low levels. Nevertheless, at the end of 2005, the average rate guaranteed on the outstanding stock of class 21 life insurance contracts still amounted to 3.85 p.c., as a result of the presence of a large number of contracts concluded before 1999, when the guaranteed rate of return in most cases amounted to 4.75 p.c. The decline in long-term interest rates thus put pressure on the profitability of these contracts, though this has now been eased by the recent upturn in fixed income yields.

In order to limit their future vulnerability to low interest rates, insurance companies have introduced more flexibility in their class 21 life insurance contracts. For example, while up until the end of the 1990s, the guaranteed rate valid at the time of conclusion of the contract was applicable to all future premiums, most new contracts only guarantee the rate valid at the time of receipt of the premium, which may thus be adapted to changes in market conditions. As most of these new contracts make it easier and less costly for policyholders to surrender their policies, insurance companies have, at the same time, increased their exposure to surrender risk, especially in the event of a sharp rise in interest rates. In such a context, insur-

CHART 10 PROFITABILITY OF GUARANTEED RETURN LIFE INSURANCE CONTRACTS

(Percentages)



Sources: CBFA, CEIOPS, NBB.

(1) Information available up to end 2005.

(2) Interest rate on the secondary market for ten-year Belgian government bonds (OLOs) (daily data).

(3) A dynamic adjustment to market rates is used.

(4) The maximum rate is subject to the term structure of business written, and may only be allowed if stress tests show that the company is capable of paying these rates.

ance companies could be faced with the choice either to increase the return on their contracts or to accept a reduction in their volume of business, which, in both cases, would depress profitability.

2. Resilience of financial infrastructure

2.1 General oversight principles and public disclosure of central banks' oversight activities

The safety and efficiency of the Belgian financial infrastructure is a prominent policy objective of the NBB. The NBB oversees a variety of infrastructures which are based in Belgium or which are of systemic importance for the Belgian financial sector.

In May 2005, the Committee on Payment and Settlement Systems issued a report on "Central bank oversight of payment and settlement systems", which included five general principles for effective oversight. The NBB performs its oversight activities on the basis of these principles, which deal with transparency of the oversight

function, the adoption of internationally recognised oversight standards, the need for central banks to have the power and capacity to carry out their oversight responsibilities effectively and consistently, and cooperation with other authorities.

The concern for transparency has led central banks to disclose their oversight activities. Such disclosure can cover four main areas, *i.e.* the overseers' responsibilities and policies, the processes and practical organisation of the oversight, the methodology used in the oversight assessments and, finally, the results of oversight assessments. Whereas the disclosure of oversight responsibilities, processes and methodologies is generally acknowledged as contributing to the fulfilment of the oversight objectives, namely the promotion of safe and efficient payment systems, the position is less clear for the disclosure of oversight results.

On the one hand, it can be argued that disclosure of assessment results could have a positive impact on market discipline and that it might strengthen the effectiveness of moral suasion. On the other hand, the disclosure of assessment results raises important issues which have to

be carefully considered by central banks. What should be done in case of “bad” assessment results? What are the potential liabilities for central banks? What should be the frequency and level of detail of disclosure? In the case of international cooperative arrangements, how to handle a situation where the cooperating central banks do not agree on the appropriateness of disclosure or on the assessment conclusions themselves?

2.2 Measuring liquidity risk in systems providing payment and settlement services: statistical approaches for overseers

Payment and settlement services play a crucial role in the proper functioning of the global financial system, as they support the transfer of cash and financial assets between financial intermediaries. Central banks need to ensure that these infrastructures do not stop functioning in times of market stress.

Stress tests are used to measure the consequences of “what if” questions, such as “what if a worst case scenario materialises”. One such scenario envisages the failure of a large participant of an infrastructure. This scenario is inspired by the standards issued by central banks with respect to Systemically Important Payment Systems in which multilateral netting takes place, and to Securities Settlement Systems. The rationale behind these standards is that the systems should be capable of ensuring timely settlement in the event that the participant with the largest payment obligation is unable to pay.

But how should this risk be measured? The aim of this article is to discuss different methodologies for measuring the liquidity risk run by a payment or settlement system in normal and in stressful times, defined as the failure of the participant with the largest payment obligation. While a historical approach already takes into account extreme circumstance (i.e. where the participant with the largest exposure defaults), we illustrate that one might consider to supplement it by alternative methods to measure potential risk during periods of market stress. Additional tests to measure liquidity risks in stressful circumstances might introduce fat tails, time-varying volatility of the net liquidity position, and correlation estimates between available liquidity and large exposures that differ from historical estimates.

2.3 Cross-border securities settlement and risk analysis framework for cross-border links

One of the important existing channels for settling cross-border securities transfers is through links between (I)CSDs. Depending on the location of the counterparties’ securities account, links can facilitate two types of cross-border settlement: cross-system or internal cross-border settlement. The risk profile of such transfers is defined by the multi-jurisdictional context and the possible role that intermediaries may play in the settlement process. (I)CSDs establishing investor links with another (I)CSD have to comply with the CPSS-IOSCO Recommendation 19 on “Risks in cross-border links”. (I)CSDs are required to conduct a risk analysis of the design of the link as well as of the financial integrity and operational reliability of the linked issuer (I)CSD.

As Recommendation 19 does not provide concrete “tools” to conduct the assessment in practice, the NBB has set up a Risk Analysis Framework that functions as a guideline for the interpretation of this Recommendation. In its capacity as overseer, the NBB is implementing this Framework in regard to all (I)CSDs established in Belgium that have established investor links with other (I)CSDs. The Framework itself, applicable to all actors in executing cross-border settlement, is composed of a list of topics and questions that address relevant risks in cross-border settlement related to the legal, settlement, financial, control and operational environment in which a link between (I)CSDs operates.

2.4 The Belgian Financial Stability Committee initiatives on business continuity planning

The resilience of a global financial system is heavily dependent upon its weakest link, as made clear by the events of September 11. Therefore, several countries have launched business continuity planning (BCP) initiatives in order to identify the critical players in their financial system, to obtain a clearer view of the state of preparation of these institutions and to identify any single points of failure. In Belgium a national initiative on BCP has been taken by the Financial Stability Committee (FSC), a committee composed of the members of the management committees of the Banking, Finance and Insurance Commission (CBFA) and the NBB. The objective is to ensure that every critical financial institution or infrastructure puts into place broadly equivalent arrangements in order to be able to recover interrupted transactions and resume new transactions within a very short time frame, in the event of being affected by any kind of operational disruption.

The article describes the main institutions, infrastructures and functions identified as critical for the smooth operation of the Belgian financial system, reviews the main BCP recommendations addressed in October 2004 by the FSC to these critical actors, and details the main activities of the permanent monitoring structure put in place to ensure that the objectives are achieved. The FSC intends to follow up further developments in business continuity management by focusing on topics where it could bring added value to the efforts undertaken by the critical actors themselves in order to improve the resilience of the Belgian system as a whole.

3. Thematic articles

3.1 Cross-border crisis management: a race against the clock or a hurdle race?

Over the last decade, financial integration in Europe has led to the gradual emergence of very large cross-border banks. Discussion and debate regarding the supervisory architecture for these institutions have recently become lively and intense. Supervisory responsibilities are, however, intrinsically linked to crisis management functions; yet, crisis management also raises specific issues in a cross-border setting.

The analysis of the difficulties involved in cross-border crisis management starts by identifying obstacles to swift crisis resolution in a purely domestic context. Part of the complexity is attributable to the fact that banks combine retail and wholesale sources of funding, and often also operate a mix of business lines. Cross-border crisis management gives rise to additional hurdles. In particular, nationally based crisis management responsibilities for cross-border institutions can lead to conflicts of interest between national authorities in a crisis, and these conflicts are likely to be amplified when public funds are at stake. In addition, authorities' responsibilities, defined along national lines, may be incompatible with banks' functional and/or business line approach to their operations, which often transcend national borders. Contradictory national legal frameworks could also constitute obstacles to crisis resolution.

Initiatives taken to facilitate cross-border crisis management centre on two key aspects. First, laws relating to banking supervision and crisis management in European Member States have been harmonised. Second, supervisory co-ordination has been reinforced and convergence of supervisory practices fostered. Further improvements could come from the formulation of explicit crisis resolution arrangements. This would necessitate agreement on

conditions for potential recourse to public funds, clear definition of the authorities' responsibilities for cross-border crisis management, and tests on whether these responsibilities are compatible with the agreement on potential recourse to public funds and with the allocation of supervisory responsibilities. As the current framework gives rise to different sources of moral hazard, solving this question could eventually reinforce market discipline.

3.2 The impact of sector concentration in loan portfolios on economic capital

The need to manage sector concentration risk in banks' credit portfolios is generally well recognised. Basel II stipulates that this risk should be addressed in the context of the supervisory review process (Pillar II). Existing literature, however, does not provide much guidance on how to measure sector concentration risk, or on how particular levels of sector concentration should be translated into capital requirements. This article addresses these questions by simulating loss distributions of loan portfolios with sector distributions that are similar to real banks' portfolios. In particular, it analyses the effect that an increase in sector concentration will have on a bank's economic capital, which is defined as the amount of capital needed to cover losses up to a specified percentage of the portfolio loss distributions. The loss distributions are simulated in the default-mode version of the CreditMetrics multi-factor model.

The starting point is a benchmark portfolio that reflects the sector distribution of aggregate loans to corporates and SMEs in the German banking system, obtained from the Central Credit Register. Since the exposure distributions across business sectors are similar in Belgium, France and Spain, it is expected that the main results also hold for other European countries. A sequence of portfolios with increasing sector concentration is then built up in order to analyse how the increasing concentration affects the economic capital. The last and most concentrated portfolio contains only exposures to a single sector. Compared with the national benchmark portfolio, economic capital for a highly concentrated real portfolio can increase by 37 p.c. and even by 50 p.c. in the case of a single-sector portfolio.

These results clearly underline the necessity to take inter-sector dependencies into account for the measurement of credit risk, and suggest the need for research aimed at developing simple quantitative tools which can be used to measure concentration risk. This issue may also have a system dimension if the degree of sector concentration is high at the level of an entire banking system.

3.3 The new solvency framework for European insurance companies

While the new Basel II solvency framework for banks has already been finalised and will enter into force in Europe as from 2007, the reform of the European solvency framework for insurance companies is still under way. The new framework, called Solvency II, has been inspired by Basel II as it broadly serves the same goals. It aims to make the new capital requirements more risk sensitive and to encourage the individual institutions to improve the quality of their risk management procedures.

This article starts by listing the main weaknesses of the current solvency regime for insurance companies and then describes the characteristics of the new framework and the improvements it entails. It presents the general structure of the new system which rests on a three-pillar approach similar to that of Basel II. It focuses more particularly on the first pillar, which includes quantitative requirements relating not only to the level of capital but also to the technical provisions and to the investment policy. Where appropriate, the article points to the resemblances and differences in relation to the Basel II framework for banks.

Financial Stability Overview

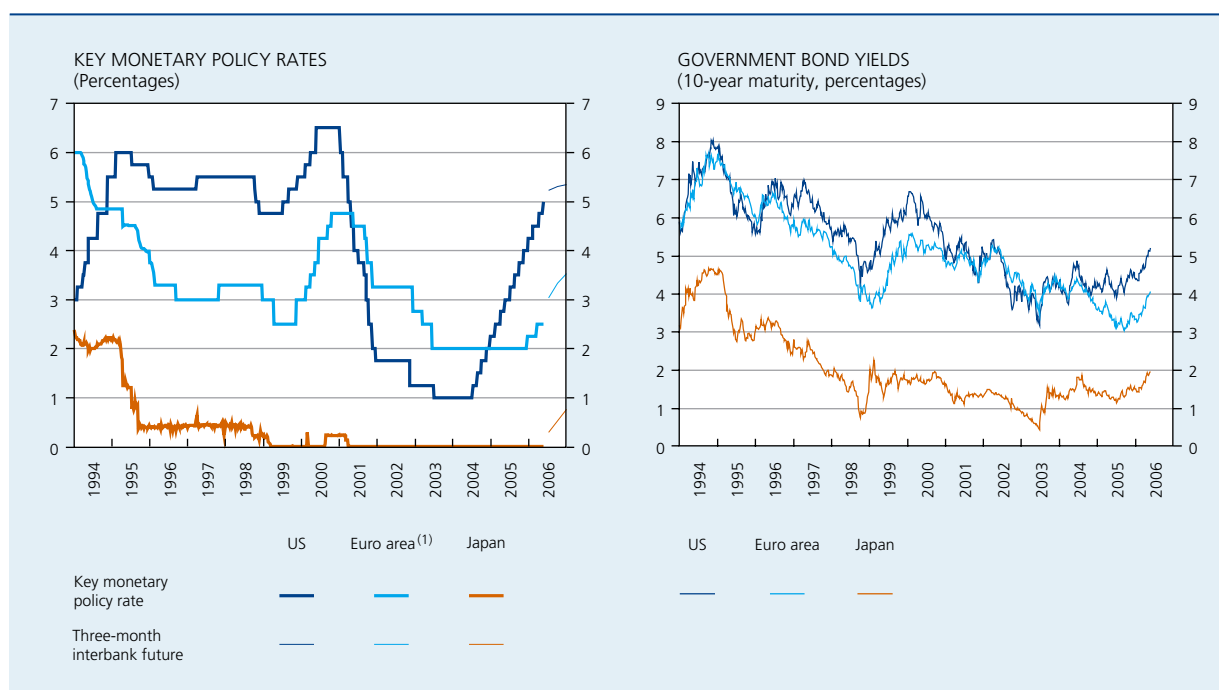
1. International financial markets

Up until May 2006, financial markets experienced a prolonged period of tranquil conditions.⁽¹⁾ The further withdrawal of monetary policy accommodation in the US, the start of monetary tightening in the euro area and the decision by the Bank of Japan to exit its quantitative easing policy had indeed been going hand in hand with historically low volatilities and risk premiums in financial markets, against the backdrop of a strong appetite for risk of investors and high and increasingly broad-based

global economic growth. The successive increases in the fed funds target rate and the prospect of (additional) rate hikes in the euro area and Japan led to a gradual increase in long-term bond yields, but yield curves in the three main currency areas remained rather flat, primarily as a result of contained inflation expectations and moderate, albeit rising, real interest rate levels at long maturities (Chart 1). Upward pressures on nominal long-term interest rates

(1) The analysis in this Overview is based upon information and data available as at 15 May 2006.

CHART 1 MONETARY POLICY RATES AND GOVERNMENT BOND YIELDS



Source: Thomson Financial Datastream.

(1) Germany before 1999.

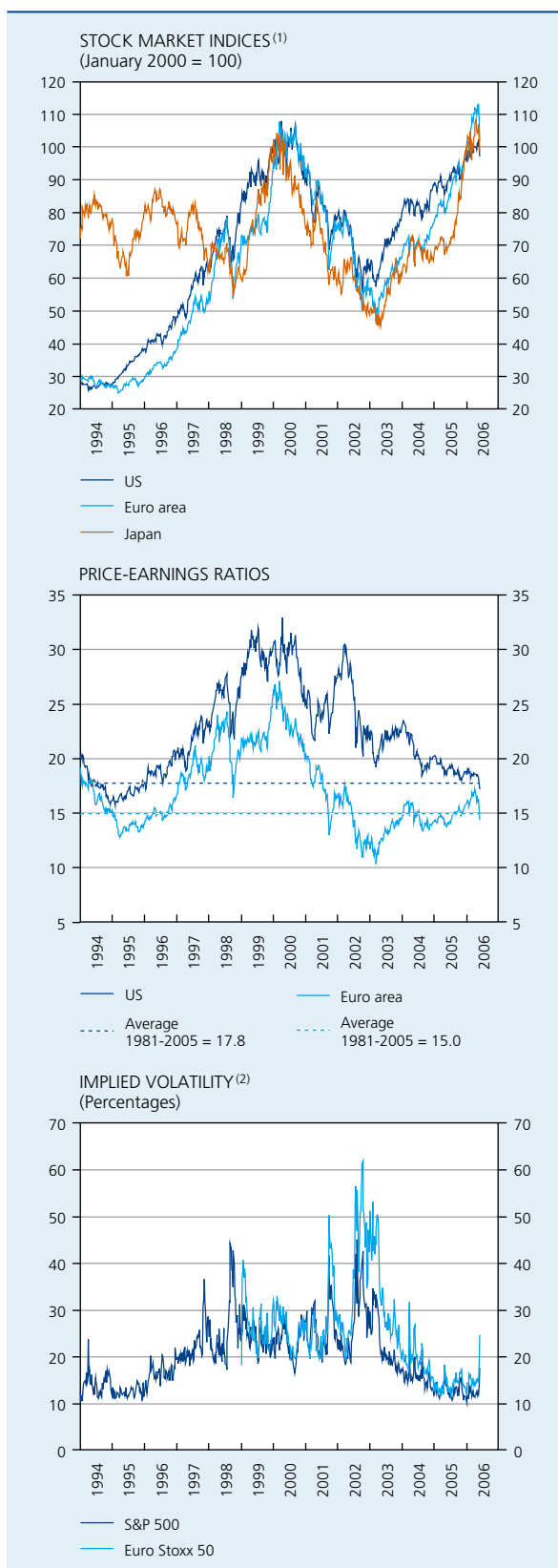
may also have been dampened by some potentially more short-lived or one-off factors, such as asset re-allocations by pension funds and life insurance companies in favour of fixed income securities or the recycling of petrodollars and increasing foreign exchange reserves into (US) long-term government bonds.

Growing uncertainty over the outlook for growth and inflation and concerns over the persistence of large current account imbalances in the global economy led to more unsettled conditions on global financial markets in May 2006 and, in particular, to large price corrections in commodity and stock markets (Chart 2). The sharp equity market declines were associated with an upsurge in implied stock market volatilities to their highest levels since 2004. During the largest part of the period under review, these measures of investors' expectations of future stock market volatility had proven relatively immune to rising short- and long-term interest rates, the sharp increase in various energy and commodity prices, the deteriorating financial situation of major corporations in the US automobile industry and airline sector, and the bankruptcy of the important futures broker Refco. This could suggest that the earlier "benign" conditions on global financial markets may partially have reflected a too optimistic assessment of corporate earnings prospects by investors.

It remains nonetheless that the financial health of the non-financial corporate sector in the US and the euro area has much improved after years of double-digit profit growth and balance sheet restructuring. While the earlier strong growth of equity prices had lifted the US, euro area and Japanese stock market return indices back to the levels that had prevailed on the eve of the bursting of the equity market bubble in March 2000, price-earnings ratios – in contrast to the situation prevailing at the end of the 1990s – remained close to their historical averages, reflecting the double-digit corporate profit growth in recent years. In the euro area, the price-earnings ratio fell back to its 25-year average of 15 in the course of 2001, and subsequently fluctuated within a narrow range around this value. In the US, the process of mean reversion took longer, as it was 2005 before the price-earnings ratio returned to its long-run average of 17.8.

Thanks to strong cash flows, the US non-financial corporate sector registered a net financial surplus in 2005, following the gradual closure of its financing gap after 2000, when it had peaked at 3 p.c. of GDP. A similar reduction in the corporate financing gap took place in the euro area. Yet, US and European corporations are gradually turning more expansionary again, as suggested by the pick-up of real capital expenditures, the higher number

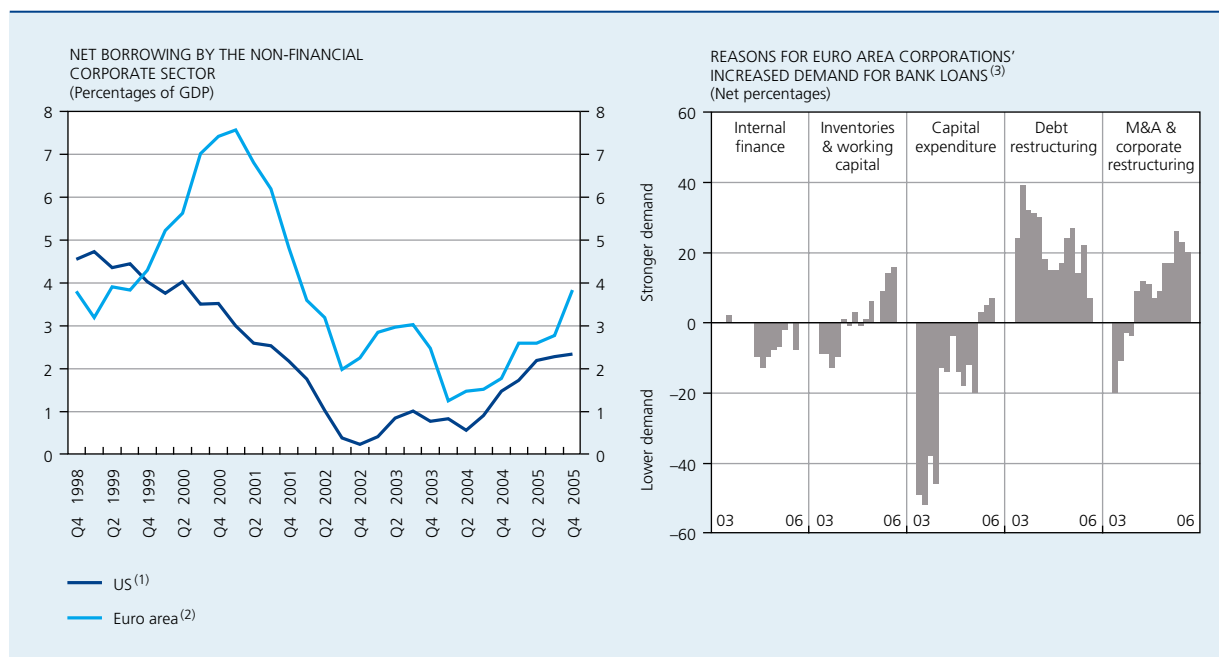
CHART 2 EQUITY MARKETS



Source: Thomson Financial Datastream.

(1) Return indices in local currency, calculated by Thomson Financial Datastream.

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

CHART 3 NON-FINANCIAL CORPORATE SECTOR BORROWING

Sources: ECB, US Federal Reserve Board.

(1) Borrowing through credit market instruments.

(2) Borrowing through loans and securities other than shares.

(3) Net percentage of credit officers surveyed in the Eurosystem's Bank Lending Survey citing the factor concerned as a factor contributing to higher (+) or lower (-) demand for corporate loans during the quarter.

of mergers and acquisitions (M&As) and the increased focus on shareholder-friendly corporate actions such as increased dividends and equity buy-backs. This may, in turn, eventually lead to an increased need for external financing.

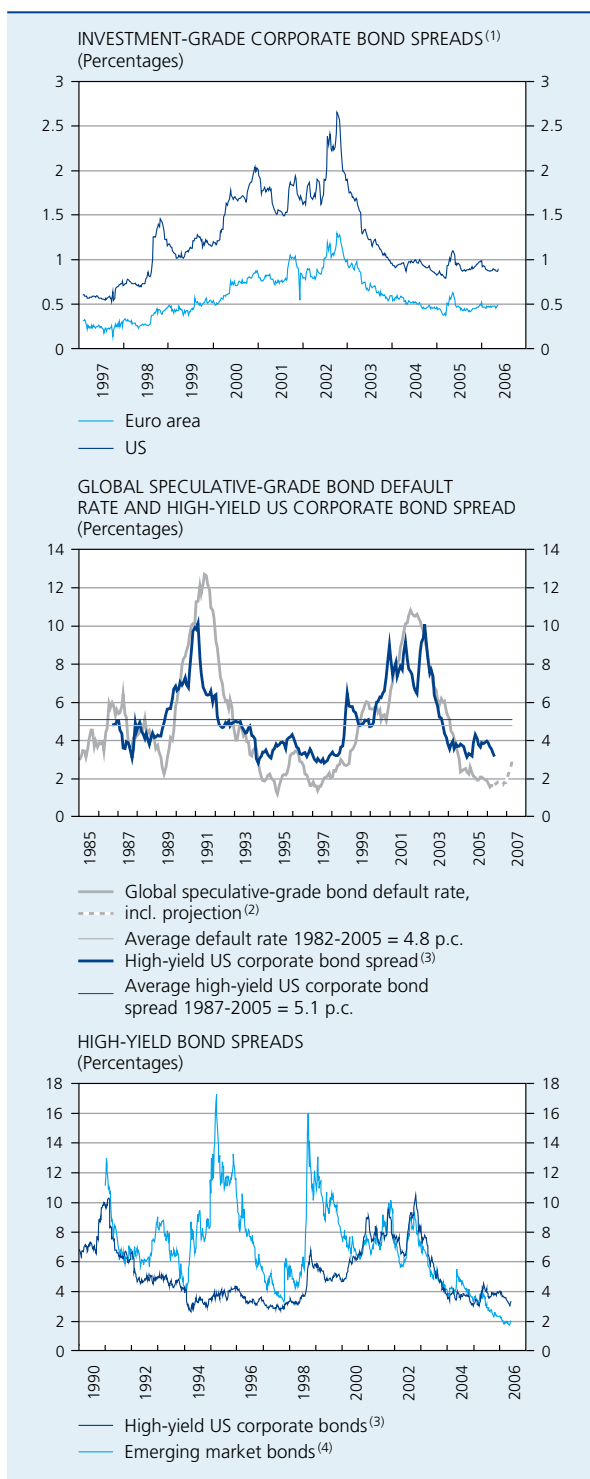
As a matter of fact, in spite of the presence of substantial cash reserves on the corporate sector's balance sheets, corporate borrowing from markets and financial institutions has already been rising since 2004 in the US and the euro area (Chart 3). Given the low cost of debt – historically and as compared to the cost of equity –, some corporations may have found it opportune to operate some re-leveraging of their balance sheets, with or without returning part of the proceeds to their shareholders (e.g. through equity buy-backs). Other corporations used debt financing to undertake mergers and acquisitions, whose total number and value reached high levels in the second half of 2005 and the first half of 2006. In this connection, the latest ECB Bank Lending Surveys identify “M&A and corporate restructuring” as a significantly more important cause for the increased *net* demand for bank loans in 2005 than capital expenditures or working capital financing needs. While debt restructuring was also an important reason for corporate loan demand in earlier quarters, it

was presumably not a major factor behind the observed increase in *net* borrowing, as this factor mostly refers to debt refinancing operations (e.g. to lower the cost of debt and/or to lengthen the maturity of the debt). The importance of this last factor significantly decreased in the first quarter of 2006.

A notable development in the corporate M&A market was also the increased number of leveraged buy-outs, which in certain instances led to significant changes in the capital structure of the targeted companies that were detrimental to the existing creditors. Notwithstanding this increased incidence of “event risk”, risk premiums in the corporate bond markets have remained close to the historically low levels that were reached at the beginning of 2005, just before concerns over the financial health (and subsequent downgrading) of Ford and General Motors led to a spike in credit risk premiums and some temporary turbulence in the credit derivatives market (Chart 4).

Although close to the lowest levels reached since 1997, the spread on high-yield US corporate bonds remained within one standard deviation of its average level over the period 1986-2005. Moreover, the high-yield spread continued to track the movement in the global

CHART 4 CORPORATE AND EMERGING MARKET BOND SPREADS



Sources: Bloomberg, JP Morgan Chase, Merrill Lynch, Moody's, Thomson Financial Datastream.

- (1) Option-adjusted spreads, vis-à-vis government bonds.
- (2) The global speculative-grade bond default rate is an issuer-weighted, 12-month trailing figure, measuring the number of speculative-grade bond defaults as a percentage of the number of rated issuers. For this series, Moody's makes a projection one year ahead, based on a proprietary model.
- (3) Corporate bonds denominated in US dollar with a rating lower than BBB / Baa3; spread relative to the interest rate on ten-year US Treasuries.
- (4) EMBI and EMBIG (from January 1998) indices; spread relative to the interest rate on US Treasuries with a corresponding maturity.

issuer-weighted speculative-grade bond default rate, which dropped to 1.6 p.c. in the first quarter of 2006, its lowest level in nearly 10 years and well below the 4.8 p.c. average for the period 1982-2005. This issuer-weighted default rate is nevertheless expected to rise in the coming quarters. Indeed, more forward-looking indicators, such as the balance between the number of rating up- and downgrades, suggest that the credit quality of corporate bonds has peaked at a high level and may gradually deteriorate henceforth, as a result of slower profit growth, a re-leveraging of corporate balance sheets and tighter financing conditions. Default rates typically also respond with a 2 to 3 year lag to high volumes of low-rated debt issues, as has occurred in the past two years.

Spreads on high-yield emerging market bonds, which had closely followed the movement in high-yield corporate bond spreads, decoupled from them in the course of 2005, leading spreads on this type of high-yield debt to historically low levels. This development was undoubtedly fostered by the keen appetite of investors for these assets, which extended to the local currency debt instruments and led to a significant decline in spread differences between emerging market borrowers (weak discrimination). It was also underpinned by a significant improvement in the creditworthiness of sovereign borrowers from emerging markets, as can be gathered *i.a.* from the three-notch improvement in the average foreign currency rating of sovereign emerging market borrowers since 1995 (to BB). Current account surpluses, stronger fiscal positions, high foreign exchange reserves and more flexible exchange rate regimes have reduced – but not eliminated – the potential vulnerability of emerging markets to external shocks and changes in investor sentiment. Many emerging market countries have in recent years also brought down public and external debt levels, and undertaken active debt management operations to reduce their sensitivity to exchange rate, interest rate and roll-over risks. However, the recent turbulence in emerging stock markets is a salutary reminder that these important structural changes in the macroeconomic environment and policy setting do not shield emerging markets from speculative froth or abrupt changes in investors' appetite for risk.

Important structural changes have also taken place in global financial markets. New financial instruments and market segments, as well as advances in risk management techniques, have made financial markets more complete and sophisticated. Notable developments in recent years in this regard have been the explosive growth in the outstanding amounts of risk transfer and structured finance instruments and the growing importance of hedge funds and other non-bank financial institutions in financial

markets. According to data from the International Swaps and Derivatives Association, for example, the notional amount outstanding of credit derivatives (including credit default swaps, credit-linked notes and portfolio swaps) rose to more than 17.3 trillion US dollar at the end of 2005, up from less than 4 trillion US dollar at the end of 2003.

These changes in the global financial system have improved the efficiency of global credit markets, and stimulated a wider dispersion of risk throughout the financial system by increasing the risk transfer, hedging and diversification opportunities for individual financial institutions. However, as the growth of the most recent market segments occurred in a period of high macroeconomic stability and low credit losses, risk premia and volatilities in many asset markets, it remains uncertain how these markets will perform in the face of systemic macroeconomic or financial stress. The accumulation of an important backlog of undocumented and unconfirmed credit derivatives trades – which is in the process of being addressed – is but one of the potential financial stability concerns that have been voiced in connection with the rapid growth of risk transfer and structured finance markets and the growing involvement of non-bank financial intermediaries. These include issues related to the growing opaqueness as to where the ultimate risk exposures are located in the financial system; the creation of new and additional layers of leverage in the financial system by these new instruments, which are moreover often highly complex, illiquid and difficult to value; and uncertainty over how important leveraged market participants will react to a systemic credit event and what the consequences of this will be in terms of market liquidity and asset prices.

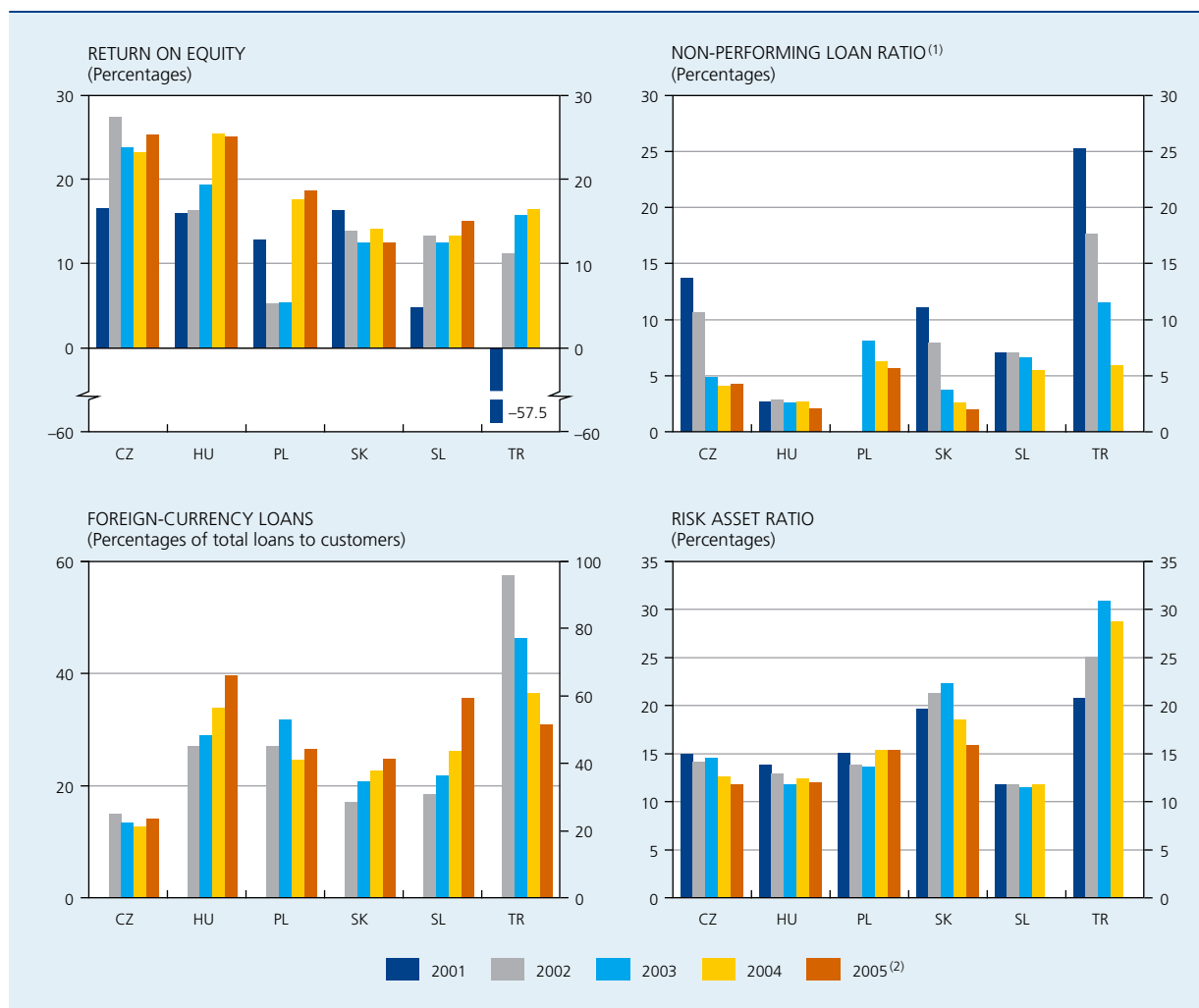
The net impact of the above-mentioned structural developments in the credit markets on the risk profile of banks can also be ambiguous. While banks can use the credit risk transfer instruments to transfer part of their credit risk exposure to other investors or, in contrast, to diversify their loan portfolio by taking on additional exposures, the increased use of credit risk transfer markets also leads to a commensurate rise in counterparty risks and potential exposures to market liquidity shocks. Moreover, as originators and servicers of the assets included in structured finance products, banks are often required to retain some residual risk exposure to the assets involved, so as to minimise agency problems. In order to compensate for low yields and low volatilities in more traditional asset classes, banks may also have sought to develop new sources of income by stepping up their involvement in these credit derivatives and structured finance markets, or by providing finance and prime brokerage services to hedge funds. Such an expansion into “untraditional” market segments,

to which one may add the rapidly growing market in leveraged finance in Europe, may expose (some of) the banks concerned to unexpected losses in the event of a systemic market shock, especially if strong competition to enter these new markets was associated with an erosion of risk management standards and an underpricing of risk.

However, judging by the high levels of profitability registered by US and European banks in 2005, the ability of the banking system to deal with unexpected losses has presumably strengthened during the period under review. In the euro area, banks’ profitability was supported by continued cost control, a further drop in loan loss provisions to historically low levels and a strong recovery in fee income, especially in asset management and investment banking. Households’ strong demand for mortgage loans and a pick-up in corporate borrowing also appear to have largely offset the impact on net interest income of a decline in banks’ interest margins, which resulted from the low interest rate environment and downward pressures on loan margins caused by heightened competition between banks.

The banking sectors in the five Central European EU Member States where one of the major Belgian *banc-assurance* groups (KBC) has built up a second home market also performed strongly in 2005 (Chart 5). Profitability, as measured by the return on equity, stabilised at high levels last year, against the backdrop of favourable economic growth – which boosted lending growth and net interest income –, further improvements in cost-income ratios and lower levels of provisions for credit losses. The latter was also favoured by the improved financial situation of non-financial corporations, which, in combination with enhanced credit risk management and loan workouts by banks, contributed to a decline in the share of non-performing loans in total loans.

One of the main driving forces boosting bank income was the very dynamic growth of bank lending to the private sector, which amounted, in 2005, to 18 p.c. in Hungary and Poland, 22 p.c. in Slovenia and Slovakia and 24 p.c. in the Czech Republic. Lending to households was often the most dynamic component of bank lending which was previously dominated by loans to the government and large corporations. In some countries, loans to the corporate segment of small- and medium-sized enterprises (SMEs) also increased vigorously, contributing to an increase in the relative share of the retail segment in banks’ loan portfolios. While these developments help to raise the level of financial intermediation in the countries concerned – which is still well below EU levels – and increase the diversification and granularity of Central European

CHART 5
DEVELOPMENTS IN THE FINANCIAL SECTORS OF CENTRAL EUROPEAN EU MEMBER STATES AND TURKEY


Sources: IMF Global Financial Stability Report (April 2006), national sources.

(1) Non-performing loans as a percentage of total loans.

(2) Latest available.

banks' loan portfolios, they have also raised some concerns. Owing to the banks' eagerness to gain or maintain market share in the previously underserved retail segment, strong competitive pressures appear to have contributed to an easing of lending standards.

Moreover, in a number of countries, the growth in bank lending is driven by a (very) strong demand for foreign-currency loans by borrowers which are not necessarily hedged against the related foreign exchange risk. The share of foreign-currency loans in total loans to customers has been rising particularly rapidly in Hungary and Slovenia, lifting their share to more than 35 p.c. of the outstanding stock of loans. In the Czech Republic and Slovakia, this foreign-currency borrowing is mainly limited to the corporate sector, where exporting firms may have

an interest in hedging their foreign exchange exposure through foreign-currency borrowing. Yet, in the three other Central European countries, foreign-currency loans also account for a large proportion of loans extended to households, amounting respectively to 12 p.c. in Slovenia and about 30 p.c. in the case of Hungary and Poland. In the latter two countries, foreign-currency loans in Swiss Francs represent a major share of the total.

The very dynamic growth of lending to households (and SMEs), the easing of credit standards under the pressure of competition, and the strong rise in foreign-currency loans to unhedged borrowers (in some countries) may be laying the basis for higher credit losses in the future. Notwithstanding the considerable improvements in credit risk management systems, banks' ability to monitor and

assess risks properly may indeed be strained by the rapid expansion in the number of new loans being granted. Due to the fairly recent growth of the SME and household lending markets, the credit histories in these market segments are moreover limited and short, and have not yet been tested in a downturn of the credit cycle. This raises some uncertainty over whether current loan margins – though still relatively high as compared to levels registered in the EU-15 countries – are adequate to compensate for the credit risk taken on these loans. In spite of improvements in bankruptcy laws and creditor rights, some important institutional weaknesses also persist that hamper the ability of banks to recover and adequately value the collateral provided as a guarantee for loans. Lastly, the particular case of loans in foreign currency to unhedged borrowers may expose banks to a highly correlated, albeit indirect, credit risk in their retail portfolio in the event of a significant depreciation of the domestic currency vis-à-vis the Swiss Franc or the euro, for example. It may also expose them to litigation and reputation risks. Such a risk of strong exchange rate changes cannot be excluded, given the significant macroeconomic imbalances in some of the Central European countries – this is notably the case for Hungary, where the fiscal and current account deficit reached high levels in 2005.

A high current account deficit also remains a potential source of macroeconomic vulnerability for the financial system in Turkey, in which another major Belgian *bancassurance* group (Fortis) has acquired a significant market share following its acquisition of Disbank. After the very severe banking crises of 2000 and early 2001, a costly but successful bank restructuring process has taken place in Turkey, which has involved the restructuring of the state banks, the resolution of the banks transferred to the Savings Deposit Insurance Fund, and a recapitalisation of the privately owned banks, which currently account for about 57 p.c. of total bank assets. The regulatory and supervisory environment was also strengthened.

While the crisis was associated with very high losses, the Turkish banking sector returned to profitability in 2002. Interest income is the main source of income, dominated by interest income from banks' securities portfolios. Yet, bank loans to the private sector have been growing dynamically recently, driven by increased bank loan demand from large companies, SMEs and households. Given the low level of financial intermediation, there is considerable potential for further development of bank lending to the private sector, although this may, as in the case of Central Europe, entail some risks for banks if this process is not adequately managed.

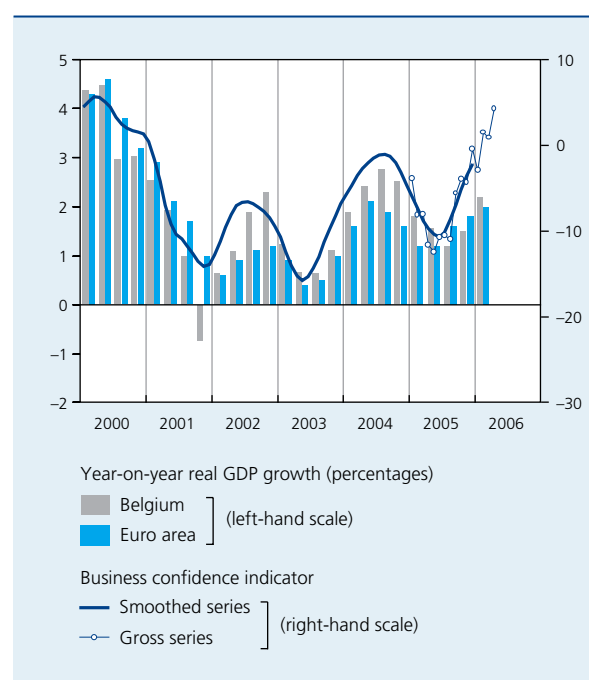
2. Private sector

The slowdown of economic growth in Belgium, which had started in the second half of 2004, came to an end during the period under review, as real annual GDP growth accelerated from 1.2 p.c. in the third quarter of 2005 to 2.2 p.c. in the first quarter of 2006 (Chart 6). The business confidence indicator tracked this recovery, and rose in April 2006 to its highest level since 2000, signalling a continuation of stronger economic growth in the second quarter of this year. Consensus forecasts project overall GDP growth to amount to between 2 and 2.5 p.c. in 2006 (versus 1.5 p.c. in 2005).

2.1 Corporate sector

Although the level of corporate profits continued to rise in 2005, the estimates of the median return on equity for small as well as medium-sized and large firms showed a small decline last year from the high levels achieved in 2004, reaching respectively 6.7 p.c. and 8.7 p.c. (Chart 7, left-hand panel). Own funds in fact rose at a slightly more rapid pace than corporate profits for reasons that will be discussed in greater detail later in this section. While these median estimates – which are based on a sample

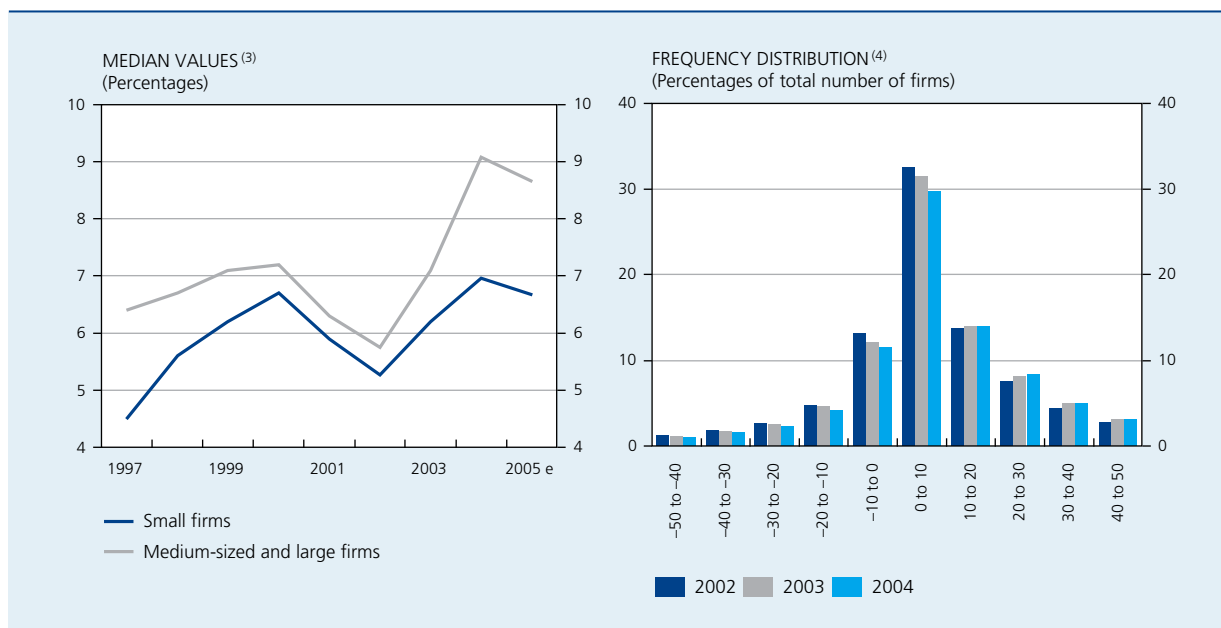
CHART 6 REAL GDP GROWTH ⁽¹⁾ AND BUSINESS CONFIDENCE



Sources: EC, NAI, NBB.
(1) Seasonally adjusted data.

CHART 7

RETURN ON EQUITY ⁽¹⁾ FOR NON-FINANCIAL CORPORATIONS ⁽²⁾



Source: NBB.

(1) The return on equity is calculated as net after tax results over capital and reserves.

(2) A company is considered to be small when it submits its annual accounts to the Central Balance Sheet Office in accordance with the abbreviated reporting scheme. Medium-sized and large companies report in accordance with the full scheme.

(3) The medians in 2005 are calculated by applying to the 2004 medians of the whole population the percentage of variation observed in a constant sample of early reporters in the Central Balance Sheet Office.

(4) Firms with negative own funds or a financial year covering less than 12 months are excluded from the distribution.

of non-financial corporations whose 2005 accounts are already available in the Central Balance Sheet Office –, are reliable indicators regarding global trends in profitability, they do not give any information about the distribution of the return on equity within the population. The frequency distribution of the return on equity of the individual non-financial corporations in 2004 – which is the most recent year for which data on the whole population are available – shifted slightly to the right as compared with

2002 and 2003 (Chart 7, right-hand panel). This confirms that the improvement in corporate profitability has been broad-based in recent years. Yet, in spite of a decrease in the proportion of loss-making firms from 30.9 p.c. in 2002 to 27.2 p.c. in 2004, their share in the whole population has remained high. Companies with a return on equity lower than 0 p.c. for three consecutive years actually accounted for 6.7 p.c. of the population during the period 2002-2004.

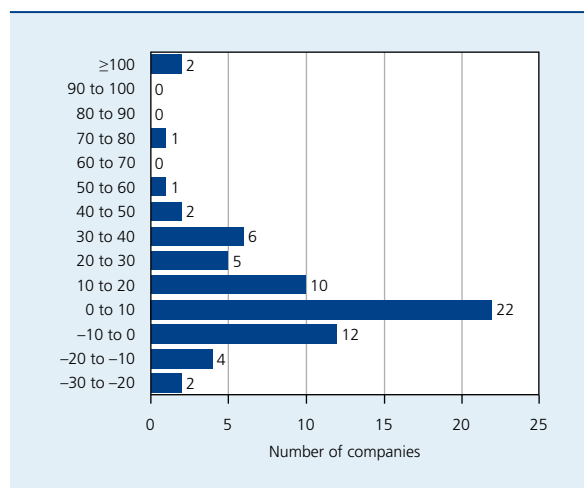
Box 1 – Impact of the introduction of IAS/IFRS on the reported equity and bottom-line result in the consolidated accounts of listed Belgian companies

For each financial year starting on (or after) 1 January 2005, Belgian companies listed on a regulated market (Eurolist by Euronext Brussels) and publishing consolidated financial statements are obliged to prepare the latter under IAS/IFRS. The CBFA, the Belgian supervisory authority, recently conducted a study⁽¹⁾ of the impact of these new accounting rules on the reported equity and bottom-line results of the Belgian companies. The analysis

(1) "Provision of information by the Belgian companies whose shares are listed on Eurolist by Euronext Brussels, on their IAS/IFRS transition and the impact of that transition on their equity and results", CBFA, Studies and documents: no. 31, March 2006.

covered respectively 67 and 62 companies for the equity and results impact, out of the 139 Belgian companies listed on Eurolist by Euronext Brussels. Amongst other reasons, the exclusion of certain companies from the study was mainly due to the early adoption of IAS/IFRS by certain companies, the absence of consolidated financial statements and the fact that the detailed information needed to conduct the analysis was not yet available.

CHART 1 IMPACT ON EQUITY AT THE TRANSITION DATE
(Percentage changes compared to the level under Belgian GAAP)



Source : CBFA.

The impact on the book value of equity at the transition date⁽¹⁾ was found to be positive for 73 p.c. of these companies. On average, the increase amounted to 13 p.c. However, the impact varies greatly from one company to another, with a maximum increase of 128 p.c. and a maximum decrease of 30 p.c. (Chart 1). The difference between the book value of equity according to Belgian GAAP as opposed to IAS/IFRS is due mainly to the obligation to prepare the IAS/IFRS balance sheet before profit allocation, and to the different accounting treatment (valuation) of deferred taxes, property, plant and equipment, provisions and post-employment benefits⁽²⁾:

- under Belgian GAAP, the balance sheet was established after the allocation of earnings, so that dividends to be distributed were considered as debt and deducted from equity. According to IAS 1, dividends may no longer be deducted from equity and recognised as debt before the general meeting approves the dividend distribution;
- IAS 12 requires the recognition of deferred tax liabilities and assets in the case of temporary differences between the amount at which an asset or liability is carried in the balance sheet and in the tax base of a corporation. Under Belgian GAAP, deferred tax assets were recognised to a much more limited degree;
- the new accounting treatment of property, plant and equipment under IFRS involves significant changes in the valuation of these items. For example, at the date of transition to IFRS, companies may measure an item of property, plant and equipment at its fair value. Moreover, the depreciation methods may also be different;
- criteria concerning the recognition of provisions under IAS/IFRS are more restrictive, so that some provisions recognised under Belgian GAAP could not be maintained according to the new accounting framework (for example provisions for repair and maintenance);

(1) The IFRS date of transition is the beginning of the earliest period for which an entity publishes fully comparable information in accordance with IAS/IFRS in its first IAS/IFRS financial statements. For most Belgian companies, the IAS/IFRS transition date is 1 January 2004.

(2) IAS 39 dealing with the recognition and measurement of financial instruments is also an important factor. However, its impact is limited as numerous companies have made use of the possibility offered by IFRS 1 not to provide information in conformity with IAS 39 until the financial year 2005.

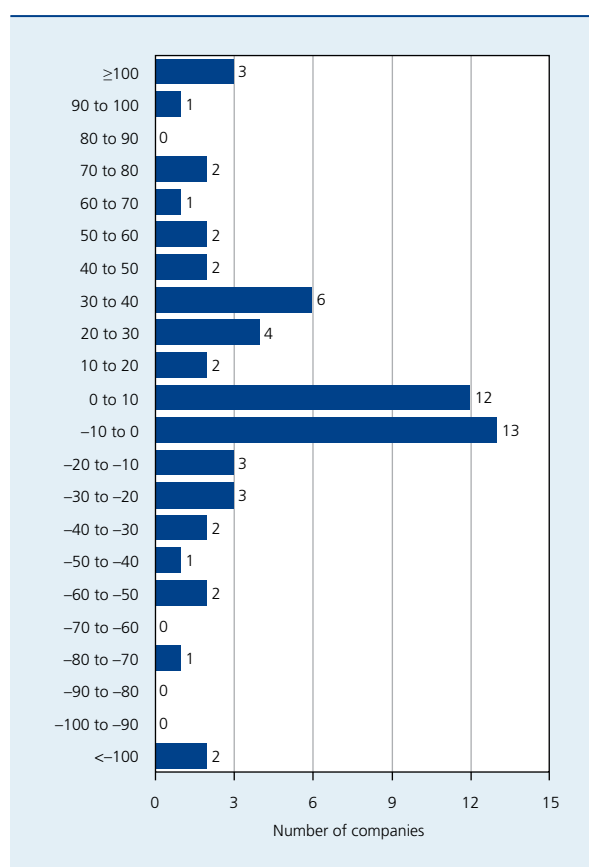


- under IAS 19, the net liability relating to post-employment employee benefits (mainly in the case of defined benefit pension plans) is recognised in the balance sheet. This net liability corresponds to the net present value of the gross obligation after deducting, among other things, the fair value of assets attached to these plans. Under Belgian GAAP, post-employment benefits often were not recorded as expenses in the income statement until payments were actually made.

CHART 2

IMPACT ON RESULTS AT THE TRANSITION DATE

(Percentage changes compared to the level under Belgian GAAP)



Source : CBFA.

The impact of the new accounting rules on the results of the transition year was positive, with an average increase of 26 p.c. Here, too, the impact varied widely from one company to another (Chart 2). On the one hand, only 56 p.c. of companies recorded an increase. On the other hand, the maximum increase was 1218 p.c. while the maximum decrease was 152 p.c.⁽¹⁾ Apart from the difference in the accounting rules for property, plant and equipment, deferred taxes and provisions – which also influenced the level of equity (see above) –, the accounting for goodwill (and negative goodwill) and for intangible assets had the largest impact on the results of the transitional financial year (taking into account the IAS 39 caveat):

(1) This last percentage means that the profit before IAS/IFRS turned into a loss of 52 p.c. of the initial profit after introduction of the new rules.



- while, under Belgian GAAP, the goodwill must be amortised annually over its life, IAS/IFRS impose an annual impairment test. If the group of assets to which the goodwill is attached, is valued in the financial statements at more than the recoverable amount, the company has to recognise an impairment loss;
- IAS 38 contains more restrictive rules on the recognition of intangible assets and their amortisation. Under the IAS/IFRS accounting framework, research expenses are not capitalised on the balance sheet in order to be amortised, while under Belgian GAAP, this is allowed under certain conditions.

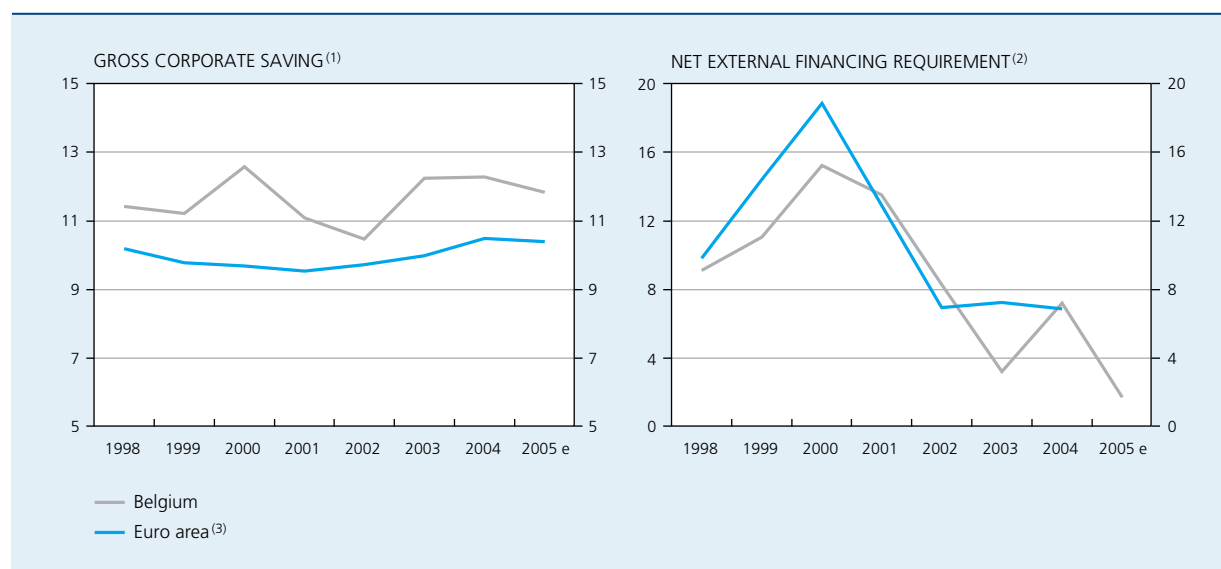
While the statutory accounts collected in the Central Balance Sheet Office are established according to Belgian GAAP, the new international accounting rules IAS/IFRS⁽¹⁾ had to be used for the consolidated accounts published by listed companies for each financial year starting on (or after) 1 January 2005. These new accounting rules have significantly affected the reported equity and bottom-line results of several listed companies. Box 1 discusses some of these issues in more detail.

Improved profitability allowed Belgian non-financial corporations to accumulate internal funds to finance their current and future investments. Between 2002 and 2004, corporate gross saving – measured as the difference between the gross operating surplus and the net payments of interests, dividends and taxes – increased from

10.5 p.c. of GDP to 12.3 p.c. of GDP (Chart 8, left-hand panel). It remained at a high level in 2005 (11.8 p.c. of GDP), despite a rise in tax outlays and higher dividend payments. Corporate investments in real assets declined from 13.4 p.c. of GDP in 2000 to 13.1 p.c. in 2005, and investments in financial assets from 14.5 p.c. to 0.5 p.c. As a result, the net external financing requirement of Belgian non-financial corporations fell from the peak of 15.2 p.c. of GDP in 2000 to 1.7 p.c. in 2005 (Chart 8, right-hand panel). In the euro area, a similar pattern was observed. Gross saving increased but to a lesser extent than in Belgium, while the net external financing requirement decreased from 18.8 p.c. of GDP in 2000 to a stable 7 p.c. in 2002-2004.

(1) IAS stands for International Accounting Standards and IFRS for International Financial Reporting Standards.

CHART 8 NON-FINANCIAL CORPORATIONS' FINANCING NEEDS
(Percentages of GDP)



Sources: Eurostat, NBB.

(1) Gross saving is equal to the gross operating surplus less net payments of interests, dividends and taxes.

(2) Net external financing requirements are the difference between gross saving and the sum of investments in real assets and net acquisitions of financial assets.

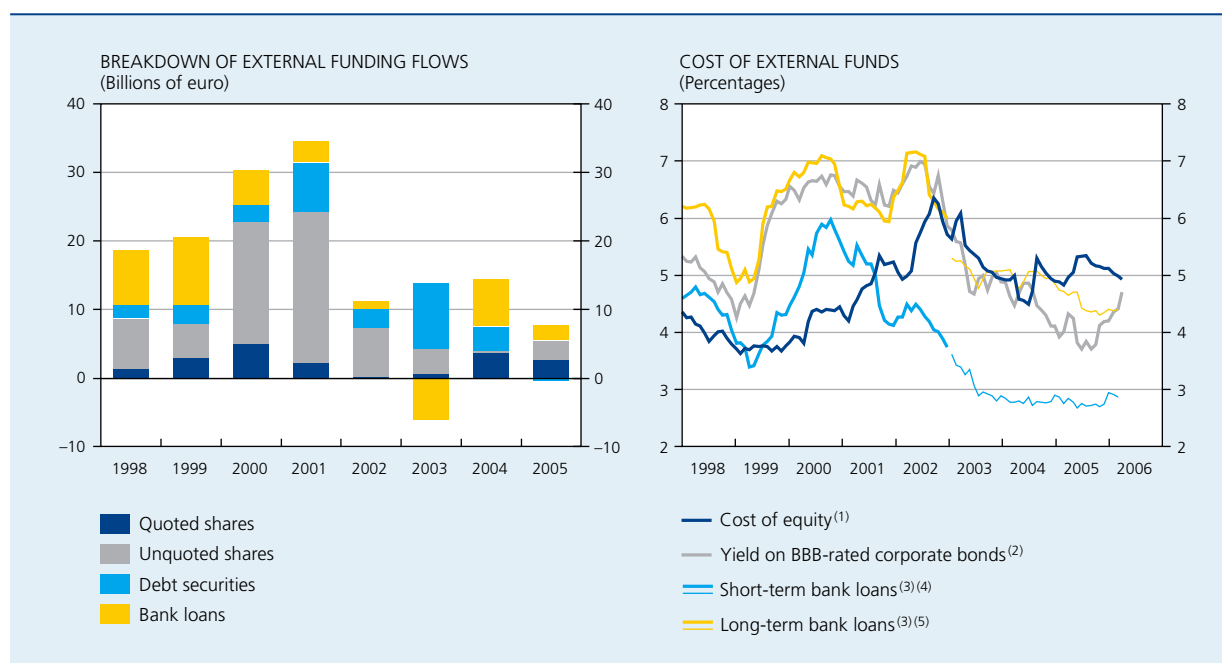
(3) Excluding Ireland and Luxembourg; including financial corporations.

In 2005, Belgian non-financial corporations' net recourse to external financing mainly took the form of equity issues (Chart 9, left-hand panel). The net amount of funds raised in the form of unquoted shares rose from 0.3 billion of euro in 2004 to 2.8 billions of euro in 2005. Net issues of quoted shares (2.7 billions of euro) decreased slightly compared to 2004, a year during which those issues had been boosted by one transaction related to the creation of the Inbev group (around 3.3 billions of euro). The higher relative share of quoted and non-quoted equity financing in 2005 was probably linked to the introduction of new legislation regarding corporate earnings taxation: the notional interest deduction (see Box 2). The objective of this new law is to ensure a more equal tax treatment between debt and equity financing by allowing corporations to deduct from their earnings a "notional" interest cost for own funds, which is calculated by multiplying the book value of equity by the yield on 10-year government bonds. This new tax rule will enter into force for the assessment year 2007, *i.e.* for profits generated in 2006. As the calculation of the 2006 notional interest deduction is partly based on the amount of capital at the end of 2005, this new rule may already have enhanced the attractiveness of equity financing in 2005, notwithstanding the increasing

gap between the (pre-tax) cost of equity and debt during that year (Chart 9, right-hand panel).

Although the cost of debt remained very low in 2005, the debt financing of Belgian non-financial corporations – measured as the sum of net new bank loans and issues of debt securities – decreased to close to 0.6 p.c. of GDP. For the first time since 1998, net annual flows of debt securities turned negative while the funds raised in the form of bank loans (2.2 billions of euro) were quite low compared with 2004. The absence of significant signs of re-leveraging sets Belgium somewhat apart from the developments taking place in the euro area and the US, where the flows in the form of debt financing have increased since 2004 (see Chapter 1). This is also illustrated in the left-hand panel of Chart 10, where the stabilisation of bank credits granted to Belgian non-financial corporations contrasts with the gradual acceleration of those loans in the euro area. Data provided by the Belgian Central Credit Register clearly show that this stagnation of bank credit in Belgium concerned mainly medium-sized and large firms, while the picture for small firms was similar to that for non-financial corporations in the euro area (Chart 10, right-hand panel).

CHART 9 SOURCES AND COSTS OF BELGIAN NON-FINANCIAL CORPORATIONS' EXTERNAL FUNDING



Sources: Thomson Financial Datastream, NBB.

(1) The estimation of the cost of equity is based on the Gordon-Shapiro model in which the cost of equity is a function of dividend yields and their long-term growth. The long-term growth of dividends is assumed equal to the potential growth of the Belgian economy. For a detailed explanation of how to estimate the cost of equity, see Box 19 in the 2005 Annual Report of the National Bank of Belgium.

(2) Yield on an index of euro-denominated BBB-rated corporate bonds with a 5- to 10-year maturity.

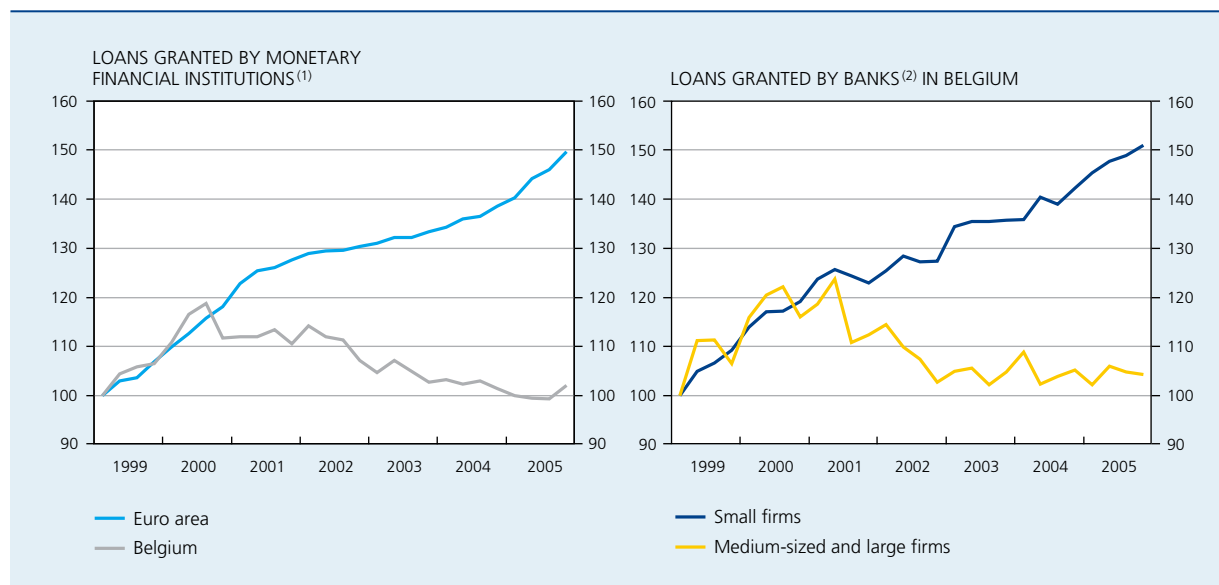
(3) At the beginning of 2003, the RIR interest rate survey was replaced by a new survey harmonised at European level (MIR survey), which led to a break in the statistical series.

(4) Rate on fixed-term (six-month) advances up to 2002; rate on loans above one million euro and with a rate initially fixed for less than one year as from 2003.

(5) Rate on 5-year investment credits up to 2002; rate on loans of less than one million euro and with a rate initially fixed for at least five years as from 2003.

CHART 10 BANK LOANS TO NON-FINANCIAL CORPORATIONS

(Indices, first quarter 1999 = 100)



Sources: ECB, NBB.

(1) Data according to Eurosystem definitions.

(2) Data based on the Central Credit Register. A company is considered to be small when it submits its annual accounts to the Central Balance Sheet Office in accordance with the abbreviated reporting scheme. Medium-sized and large companies report in accordance with the full scheme.

Box 2 – Corporate earnings taxation and the notional interest deduction

In Belgium as in most countries, the corporate tax regime favours debt financing relative to equity financing as interest payments are, in principle, fully deductible from taxable income, whereas profits are taxed (in Belgium, at 33.99 p.c. in most cases). Moreover, under the Belgian personal income tax regime, the fully discharging withholding tax is lower for interest payments (15 p.c.) than for dividends⁽¹⁾ (25 p.c.). Finally, a registration duty of 0.5 p.c. is paid on new equity issues (see Table).

The Belgian government recently took two measures to ensure a more equal tax treatment for debt financing and equity financing. First, the duty on new equity issues of 0.5 p.c. has been abolished in the beginning of 2006. Second, a deduction for equity capital, referred to as the notional interest deduction, has been introduced under the Belgian tax law. This new rule will enter into force for the assessment year 2007 (*i.e.* for profits generated in 2006). Under this system, each financial year, corporations will be allowed to deduct a certain percentage of their own funds from their taxable income.⁽²⁾ This amount will be calculated by multiplying the book value of corporations' equity by the average annual interest rate on 10-year Belgian government bonds.⁽³⁾ The book value of equity will be determined in accordance with Belgian GAAP and by reference to the company's equity position at the end of the preceding financial year (so the equity capital on 31 December 2005⁽⁴⁾ will, in principle, serve as the basis for the calculation of the first deduction in 2006). The book value of equity capital includes capital,

(1) In Belgium, there is no tax on capital gains.

(2) If the deduction exceeds the taxable profit for the year, the excess can be carried forward for seven years.

(3) The applicable interest rate will be the annual average rate on the 10-year Belgian government bonds, 2 years before the assessment year. In 2005, it is fixed at 3.442 p.c.

(4) In case of changes in the book value of equity (only for balance sheet items) during the financial year, this will be taken into account on a *pro rata temporis* basis.

OVERVIEW OF THE CURRENT AND NEW REGIMES OF CORPORATE EARNINGS TAXATION

(Percentages)

	Current tax regime		New tax regime	
	Cost of debt	Cost of equity	Cost of debt	Cost of equity
Corporate profit taxation (deductibility of taxable income)	Yes	No	Yes	Yes (notional interest deduction for risk-free part)
Registration duty on new equity issues	–	0.5	–	0
	Interest income	Dividend income	Interest income	Dividend income
Personal income taxation (fully discharging withholding tax rate)	15	25	15	25

share premiums, revaluation gains, reserves, carry-forward of profits or losses and capital investment subsidies. It will be adjusted by eliminating, among other things, revaluation gains, capital investment subsidies and items such as the net fiscal value of shares and participations recorded as financial fixed assets, or the book value of real estate rented to, or otherwise used by, the company's directors or members of their family in order to avoid "cascade effects" or to prevent abuse.

This tax system treats companies as if they had borrowed their own funds at a cost equal to a risk-free interest rate, which allows them to reduce their tax base by the notional cost of equity. This new rule will be very favourable to highly capitalised firms. Conversely, companies with a low book-to-market ratio (the book value of their own funds divided by their market value) will be disadvantaged, as their own funds will be determined by reference to their book value. Furthermore, the risk premium embedded in the cost of equity is not taken into account in the calculation of the notional interest deduction. As a result, firms with a high equity risk premium will benefit from the tax advantage to a lesser extent than firms with a lower equity risk premium, which could, on average, disadvantage small and medium-sized companies. Nevertheless, small and medium-sized companies benefit from a higher notional interest rate, as it is increased by 0.5 p.c. in their case.

This new legislation, by changing the fiscal attractiveness of equity financing versus debt financing, will influence firms' choices regarding their capital structure. Taxes, however, are not the only factor that can influence the trade-off between firms' mix of equity and debt. Agency problems and asymmetric information between firm managers and outside investors are among the other considerations that can affect firms' choices of capital structure. For instance, when firm managers are not the sole shareholders of the firm, an agency problem may arise between the outside shareholders and the managers, if the interests of the two groups are not perfectly aligned, e.g. if managers do not hold (enough) shares in the firm, or if managers obtain benefits from consuming on-the-job perquisites or engage in privately beneficial investment projects. When such an agency problem exists, managers may act in their own interests at the expense of the shareholders. While appropriately designed managerial compensation schemes can help to alleviate this problem, combining debt with equity finance for the firm may also help. Debt finance has the beneficial effect of limiting managers' ability to use the firm's cash to fund pet projects or private benefits. At the same time, too much debt relative to equity can have a negative effect, by providing both the managers and the shareholders with an incentive to undertake excessively risky investment projects, at least if the managers, as well as the shareholders, would benefit from the upside of project returns but would face limited liability with respect to the downside. The firm's optimal combination of debt and equity would balance these opposing effects.

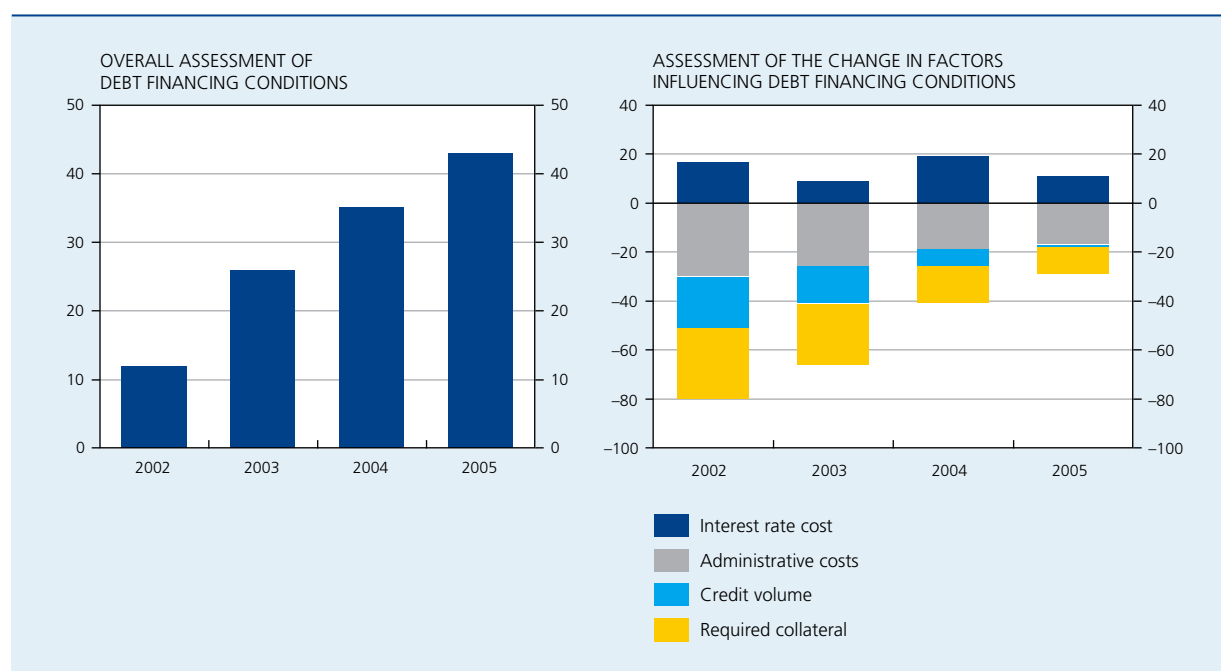


Asymmetric information between firm managers and outside investors can also influence the firm's capital structure. In this situation, the firm's choice of capital structure or investment project finance can signal information to outside investors. For example, issuance of equity to fund a new investment may be interpreted by outsiders as a signal that the value of the project is low, whereas the use of debt finance would signal that the value of the project is high. The underlying reasoning is that firm managers will only be willing to take the risk of funding a project with debt if the expected cash flows are high enough to repay the debt and avoid bankruptcy. For this reason, debt finance may be cheaper than equity finance, and firm managers may prefer to use debt rather than equity to fund new investments. Once again, however, there is a trade-off between debt and equity. The presence of too much existing debt on a firm's balance sheet may cause the firm's shareholders to oppose the financing of further investments, if most of the profit from these projects must be used to repay the outstanding debt.

The subdued growth of Belgian corporations' borrowing seems to result more from demand than from supply factors. Since 2004, an annual survey has been conducted by the National Bank of Belgium in order to analyse how companies perceive their credit conditions. In regard to the global perception of those conditions, the opinions revealed by the survey tend to be positive. The difference between the percentage of companies with a positive and negative assessment of credit conditions (the net

percentage) increased from 12 p.c. in 2002 to 43 p.c. in 2005 (Chart 11, left-hand panel). The survey also includes a separate set of questions which aim to detect corporations' perceptions about changes in interest rates, administrative costs, credit volumes and collateral requirements related to bank loans. As shown in the right-hand panel of Chart 11, only the level of interest rates has been perceived as a factor contributing to easier borrowing conditions. By contrast, the other factors have been perceived

CHART 11 RESULTS OF A SURVEY REGARDING DEBT FINANCING CONDITIONS AS PERCEIVED BY NON-BANK CORPORATIONS ⁽¹⁾
(Net percentages)



Source: NBB.

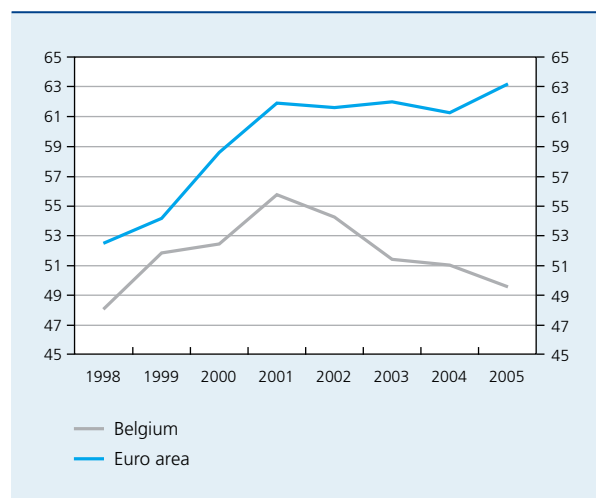
(1) The net percentage is the difference between the percentage of companies taking a positive view of credit conditions and those assessing them negatively.

as tightening, albeit to a decreasing extent, particularly for credit volume for which the net percentage was close to zero in 2005.

As already mentioned, medium-sized and large Belgian non-financial corporations have not made extensive use of bank credit or debt securities in recent years, focusing rather on a de-leveraging of their balance sheets. As a result, following a large increase in the late 1990s, the debt-to-GDP ratio of Belgian non-financial corporations has decreased significantly, dropping from 55.8 p.c. in 2001 to 49.6 p.c. in 2005 (Chart 12). Corporate indebtedness in Belgium is thus currently much lower than in the euro area, where the debt-to-GDP ratio of non-financial corporations has started to increase again, after having remained stable at around 62 p.c. of GDP between 2001 and 2004.

Corporate balance sheet restructuring translated into a sizeable improvement in solvency ratios in 2005. The estimate of the median solvency ratio of medium-sized and large firms increased from 29.5 p.c. in 2004 to 32.3 p.c. in 2005, exceeding for the first time since 1997 the corresponding estimate for small firms, which rose from 30.1 p.c. to 31.6 p.c. (Chart 13, upper panel). In this connection, it should be noted, however, that owners of small firms often make subordinated loans to their own companies which can be considered a kind of substitute for equity. A recent study conducted by *Deloitte Fiduciaire*, based on non-public accounting information,

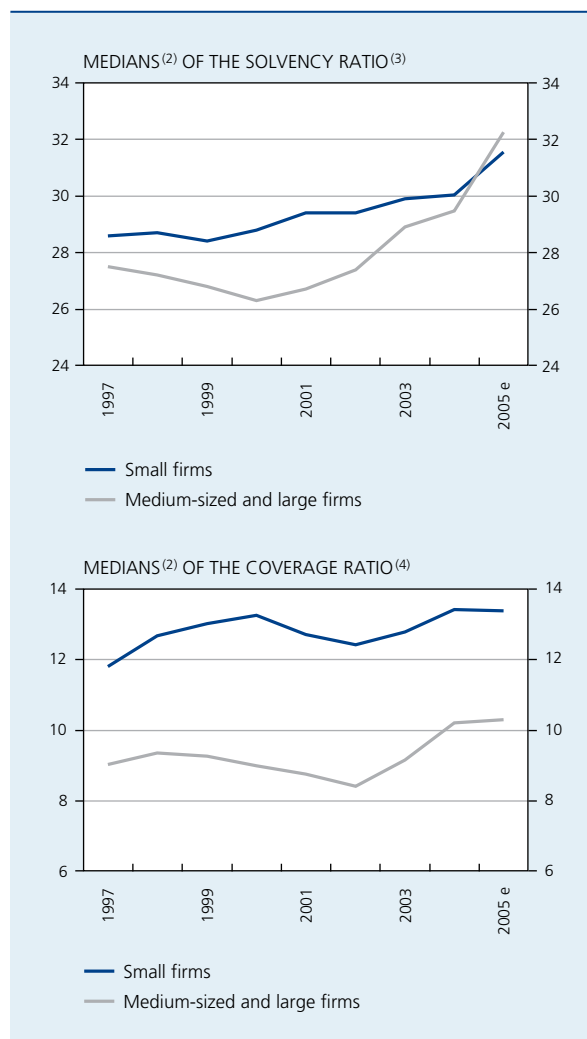
CHART 12 CORPORATE DEBT-TO-GDP RATIO ⁽¹⁾
(Percentages)



Sources: ECB, NBB.

(1) Debt includes loans granted by euro area monetary financial institutions and other financial institutions, debt securities and pension fund reserves.

CHART 13 SOLVENCY INDICATORS FOR NON-FINANCIAL CORPORATIONS ⁽¹⁾
(Percentages)



Source: NBB.

(1) A company is considered to be small when it submits its annual accounts to the Central Balance Sheet Office in accordance with the abbreviated reporting scheme. Medium-sized and large companies report in accordance with the full scheme.

(2) The medians in 2005 are calculated by applying to the 2004 medians of the whole population the percentage of variation observed in a constant sample of early reporters in the Central Balance Sheet Office.

(3) The solvency ratio is calculated 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.

has shown that the solvency ratio of SMEs would be equal to 55 p.c. if these subordinated loans are taken into account. The coverage ratio of liabilities (excluding own funds) by cash flows is another indicator to assess the ability of companies to reimburse their debts (Chart 13, lower panel). This indicator improved for small as well as medium-sized and large firms between 2002 and 2004, and subsequently stabilised at respectively 13.4 p.c. and 10.3 p.c. in 2005.

TABLE 1 **BANKRUPTCY RATES OF BELGIAN CORPORATIONS**
(Percentages)

	2000	2001	2002	2003	2004	2005
Bankruptcy rate	1.90	1.93	1.97	2.00	2.00	1.89
Bankruptcy rate of corporations having a bank credit in the year of bankruptcy or in one of the three years preceding it	1.21	1.26	1.32	1.29	1.26	1.13
Bankruptcy rate of corporations having a bank credit in the year of bankruptcy	0.58	0.63	0.65	0.62	0.62	0.51

Sources: NSI, NBB.

The improvement in the financial position of the corporate sector is also reflected in a decrease in the overall bankruptcy rate of Belgian corporations from 2 p.c. in 2004 to 1.89 p.c. in 2005 (Table 1).

Compared to this overall failure rate, the bankruptcy rate for the Belgian companies with a bank credit, and as such registered in the Central Credit Register, was much lower. It amounted to 1.13 p.c. for corporations with a bank credit in the year of bankruptcy or at least during one of the three years preceding their failure and to only 0.51 p.c. for corporations which had still a bank credit when they were officially declared bankrupt. While this difference could be partially the result of a demand effect – with some borrowers with a high risk profile deciding not to apply for bank credits –, it probably also reflects the conservative attitude of Belgian banks in the initial selection of their customers and the subsequent management of their corporate loan portfolio.

The decrease in the bankruptcy rate in 2005 could appear rather small when compared to the reduction in Belgian banks' net value adjustments on loans. However, it has to be noted that default rates are calculated in terms of number of companies, while banks' net value adjustments reflect developments in the credit quality of the total outstanding amount of credit (see section 3.2 for an analysis by outstanding amounts).

2.2 Household sector

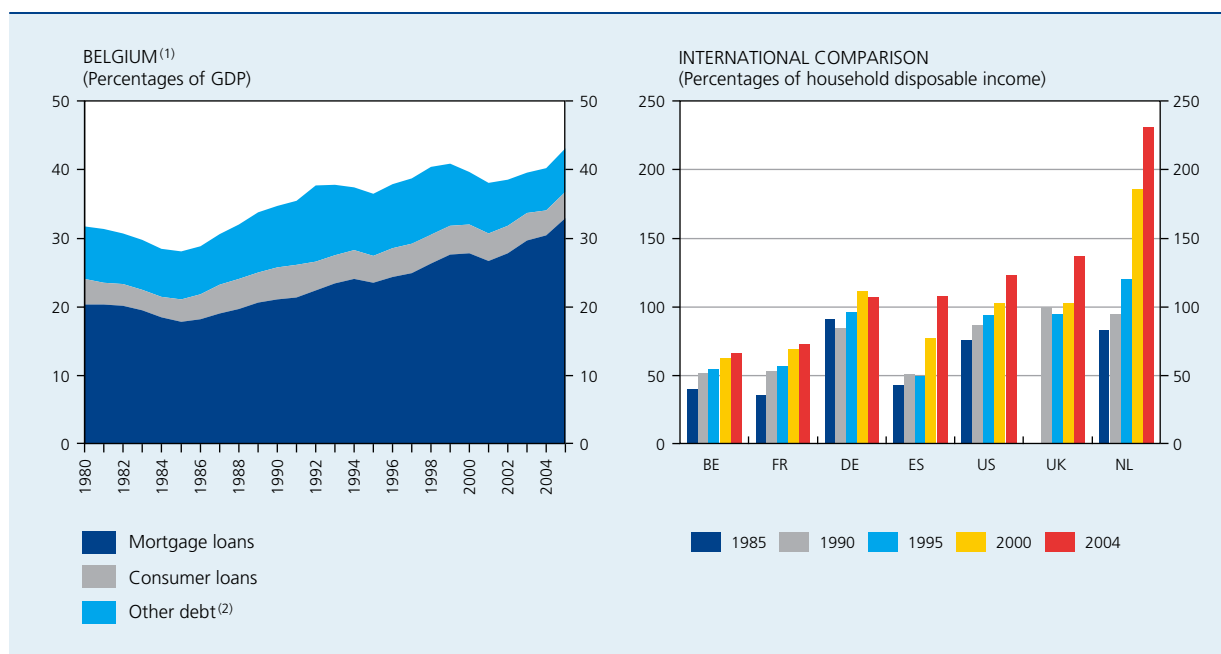
The de-leveraging operated by Belgian non-financial corporations in recent years contrasts sharply with the substantial borrowing by Belgian households. Their indebtedness reached a new peak of 43.1 p.c. of GDP in 2005, up from 28.1 p.c. 20 years ago (Chart 14, left-hand panel).

For several years now, the growth of household debt has been driven by increased mortgage borrowing, lifting the share of mortgage loans in total household debt to above 76 p.c. The relative importance of the other forms of household debt, which include consumer loans and term loans extended to the self-employed, showed a corresponding decline. Part of this decline may, however, have resulted from the growing tendency for the self-employed to incorporate their businesses, leading to an inter-sectoral shift of debt in the financial accounts between households and non-financial corporations.

The significant increase in household sector indebtedness since 1985 has certainly not been confined to Belgium. In the last 20 years, many countries have experienced a substantial increase in the ratio between household debt and household disposable income, with particularly spectacular growth rates in the most recent decade in the Netherlands, Spain, the UK, and the US (Chart 14, right-hand panel). However, a comparison of Belgian households' *gross aggregate* debt level with that observed in other countries is not, in itself, a reliable benchmark for judging the level of Belgian households' liabilities, given the still significant differences between national markets for household lending (due to differences in tax rules, market practices, degree of market completeness, etc.).

All other things being equal, for example, a country with a developed market for sub-prime mortgage lending is likely to have a larger number of households with mortgage debt than a country without this market segment, resulting in a higher level of *aggregate* indebtedness of the household sector in the former. In a similar vein, the comparatively high *gross* level of indebtedness of Dutch households is in part a reflection of the generous tax treatment of mortgage-related interest payments in the

CHART 14 HOUSEHOLD INDEBTEDNESS



Sources : Committee on the Global Financial System (2006 Report on *Housing finance in the global financial market*), NBB.

(1) Belgian households' financial liabilities, excluding other accounts payable.

(2) Including consumer loans with a maturity of less than one year.

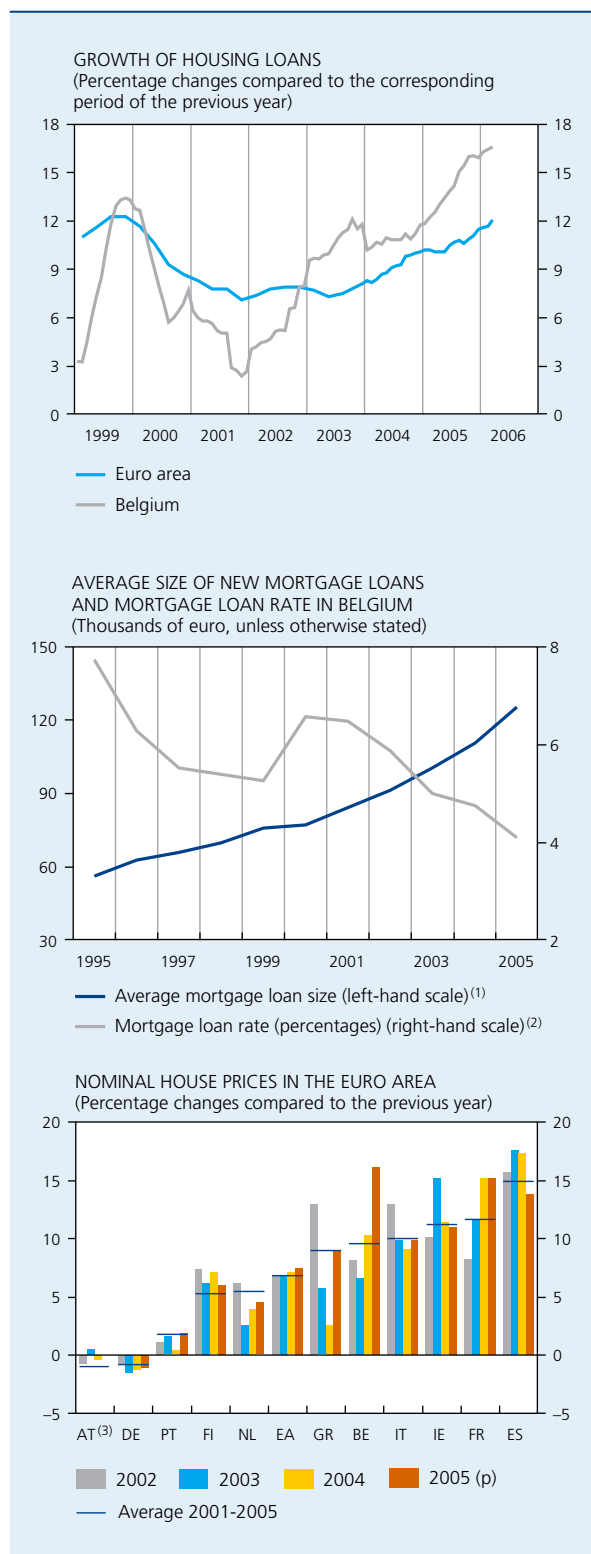
Netherlands, which encourages households to borrow through savings or equity mortgages, whereby mortgage debtors only reimburse the principal amount of their loan at maturity with funds accumulated over time in fixed interest savings or equity accounts. Differences in the typical maturity of mortgage loans – which ranges from 15 to 20 years in Belgium and France to 20 to 30 years (or more) in Germany, the Netherlands or the UK – can also explain international differences in the average indebtedness of mortgage borrowers, without resulting in a corresponding divergence in the annual debt service burden of households.

Notwithstanding the common experience in most countries of a significant decline in nominal interest rates and a general decline in credit restrictions as main driving forces behind the growth of households' financial liabilities over the past 20 years, an assessment of households' debt situation should thus focus, in the first place, on local market conditions and on changes therein. In this connection, the experience of the Netherlands in the last 15 years shows that buoyant house prices, in combination with mortgage market liberalisation, new mortgage loan products and strong tax incentives for mortgage borrowing, can lead to rapid changes in the indebtedness of the household sector.

The growth of the stock of housing loans extended by Belgian banks to Belgian households – accounting for more than 90 p.c. of total mortgage liabilities of Belgian households – accelerated during the period under review to over 16 p.c. year-on-year, *i.e.* some 4.5 percentage points in excess of the equivalent figure for the euro area (Chart 15, upper panel). The historically high flow of new mortgage loans in 2005 (20.5 billions of euro, excluding refinancing) was driven by a further increase in the number and average size of new mortgage loans. In the case of mortgage loans for the purchase of an existing house, the average size of the new mortgage loans rose last year by 12 p.c. to reach 125,000 euro, which is twice the level recorded 10 years earlier (Chart 15, middle panel).

The buoyant conditions on the mortgage market in 2005 also went hand in hand with the continuation of high house price inflation. Following a growth rate of 10 p.c. in 2004, the average selling price of houses in Belgium increased last year by an additional 16 p.c. – the highest annual percentage change recorded since 1977 –, putting Belgium into the group of euro area countries where the average annual rate of house price inflation over the past five years has been (close to) a double-digit figure (Chart 15, lower panel). The prices of apartments and

CHART 15 HOUSING AND MORTGAGE MARKET DEVELOPMENTS IN BELGIUM AND THE EURO AREA



Sources: ECB, Stadim, NBB.

(1) Mortgage loans for the purchase of an existing home.

(2) Annual averages.

(3) Average 2001-2004 in the case of Austria.

building plots in Belgium also continued to boom in 2005, with increases of respectively 13 p.c. (following 15 p.c. in 2004) and 24 p.c. (11 p.c.).

While the recent surge in Belgian house prices is part of an unusually strong and highly synchronised expansion of real estate prices in many countries in the world (with some notable exceptions, such as Germany), the current boom also stands out because of its exceptional duration and amplitude. In the case of Belgium, for example, *real* house prices – measured in constant prices to eliminate the impact of inflation – have shown a continued and steady rise between 1985 and 2005, albeit with an inter-boom cycle for apartments between 1985 and 1997 (Chart 16). This is significantly longer than the two previous boom periods that occurred in Belgian real estate prices (1960-67 and 1975-79). The cumulative increase in the inflation-adjusted average selling price of houses since 1985 has also been unprecedented, as the 5.6 p.c. annual compound rate of growth (8.6 p.c. during the last three years) has led to a tripling of the *real* house price index since 1985. A quite similar development took place in the Dutch housing market, to which a number of Belgian banks have a significant exposure (see section 3.2).

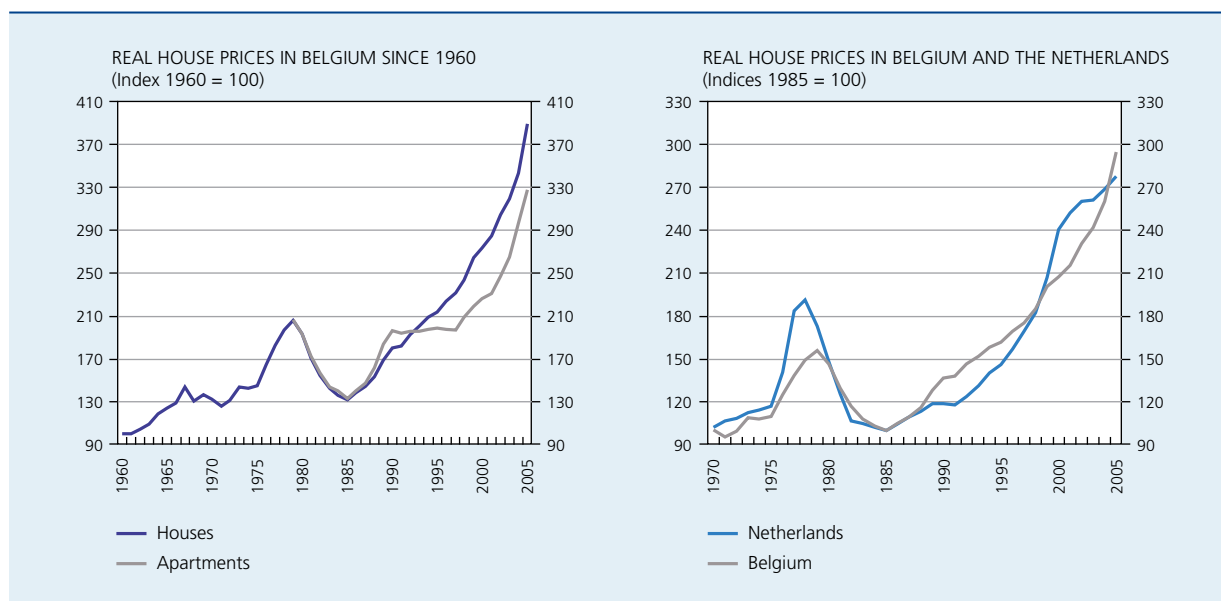
The timing of the boom-bust cycles of residential real estate prices during the last 35 years has been surprisingly synchronised between Belgium and the Netherlands. This similarity in the overall trend and amplitude of the Belgian and Dutch housing price cycles nonetheless conceals a marked difference in the momentum of house price developments in recent years. In contrast to the recent acceleration of house price inflation in Belgium, the dynamism of residential real estate prices in the Netherlands has been much more subdued since 2000, as the Dutch housing market cooled off after a period of very strong price rises between 1995 and 2000.

Whether or not a similar cooling off of the Belgian real estate market is in the offing is uncertain and is likely to depend on a multitude of factors. However, in this context one should keep in mind that, due to the inevitable time lags associated with the completion of real estate projects, property markets are particularly prone to periods of temporary price overshooting. Since supply cannot respond, in the short-term, to an increase in the demand for real estate, an unexpected increase in the demand for houses may lead temporarily to higher prices on the secondary market, until the eventual increase in supply on the primary market has restored the equilibrium between demand and supply. If these price signals are not interpreted correctly, the supply side may even overreact to the initial increase in demand.

CHART 16

REAL ESTATE PRICES IN A LONG-TERM PERSPECTIVE

(Nominal house price indices adjusted for changes in the private consumption deflator)



Sources: BIS, OECD, Stadim, NBB.

Although the introduction of new tax rules for mortgage loans (in 2005) and the tax amnesty operation (in 2004) may also have played a role, the principal driving forces behind the sharp rise in house prices during the last two years have undoubtedly been the further drop in mortgage loan rates and changes in the mortgage borrowing behaviour of Belgian households. Mortgage loan rates in fact fell to historically low levels in the third quarter of 2005, possibly marking the end of a prolonged decline in long-term mortgage loan rates from above 10 p.c. in the early 1990s to below 4 p.c. in the course of 2005. However, in order to explain the sharp increase in the average size of new mortgage loans, it is also necessary to assume that mortgage borrowers, at the margin, have taken on a higher mortgage debt burden than in the past, for example in the form of a higher annual debt service and/or a longer maturity of the loan. Anecdotal evidence confirms that the increased variety of mortgage loan products offered on the Belgian market – which most recently has concentrated on the marketing of mortgage loans with maturities of 35 years or more – has induced more households to leverage their borrowing capacity by switching to loans with maturities longer than the (previously) predominant 20-year formulas.

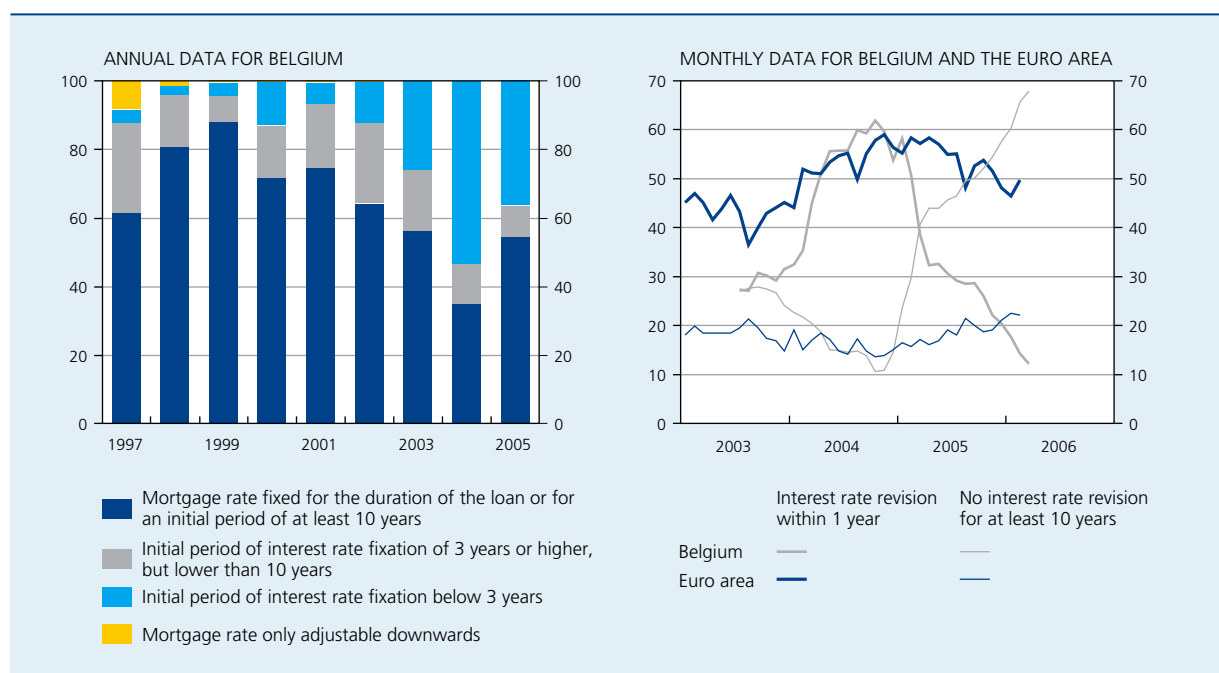
The market share of mortgage loans with interest rate variability up to 3 years, which had increased from less than 4 p.c. in the period 1997-1999 to more than 50 p.c. in 2004, declined in 2005, as the flat yield curve and

the historically low long-term interest rates reduced the attractiveness of these mortgage loan instruments (Chart 17, left-hand panel). The sharp reversal in the popularity of variable rate mortgages is also documented in the right-hand panel of the chart. The market share of mortgage loans with annual interest rate revision peaked in October 2004, and has declined to below 20 p.c., while the share of mortgage loans with an initial period of fixed interest rates of more than 10 years climbed back to nearly 70 p.c. Thus, Belgian households' relative preferences for variable and fixed rate mortgages reverted quite quickly to the historically predominant fixed rate formula, in contrast to the euro area, where variable rate mortgages remained the most frequent form of contract. On the basis of very partial evidence, it appears that mortgages with rates that will be revised in the next 5 years still account for a very small share of the total stock of mortgage loans outstanding in Belgium (below 5 p.c.).

While the vulnerability of Belgian households' mortgage debt service burden to an increase in interest rates thus appears limited – with another mitigating factor for variable rate mortgages being the accordion formulas and rate caps⁽¹⁾ –, an increase in interest rates will lead to a

(1) In accordion loans, variations in the reference interest rate during the term of the contract lead to changes, within certain limits, in the duration rather than in the repayment burden of the loan. It is moreover standard practice for variable rate mortgage loans to have a cumulative cap of 1, 2 and 3 p.c. respectively on the up- or downward adjustment that can take place in the first, second and subsequent years of the loan.

CHART 17 BREAKDOWN OF NEW MORTGAGE LOAN VOLUMES ACCORDING TO INTEREST RATE VARIABILITY
(Percentages of total)



Sources: ECB, UPC, NBB.

deterioration in the borrowing capacity of new borrowers, which might induce them to compensate for this by increasing the initial debt service and/or lengthening loan maturities. Moreover, given the historically low interest rates that were reached in 2005, and the significant wave of refinancing that took place last year (estimated to have affected 15 p.c. of the mortgage loan stock if rate revisions are also taken into account), existing mortgage loan debtors are unlikely to experience many (if any) opportunities in the near future to lower their nominal mortgage debt service burden by refinancing their loan at a lower interest rate, which carries a financial penalty of only 3 months' interest in Belgium. In the last 15 years, there have been several waves of refinancing whereby Belgian households lowered their nominal debt service level, basically keeping the amount borrowed constant, without proceeding to equity withdrawal.

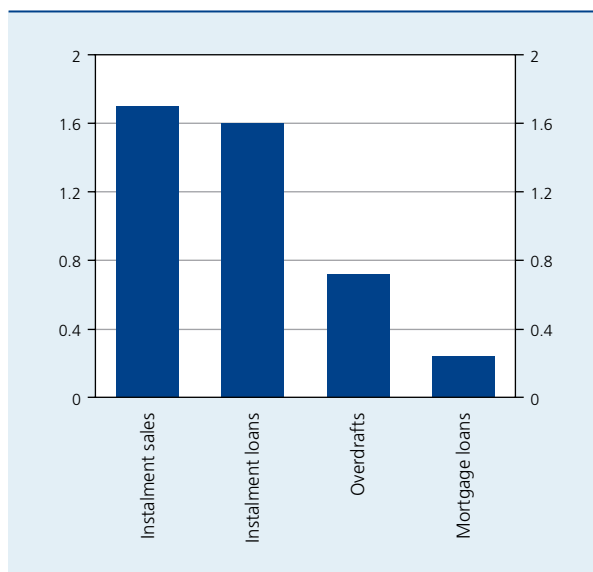
Looking ahead, the average mortgage debt service burden of Belgian households may thus be higher than in the past. Since households with a debt service burden declining more slowly as a percentage of disposable income will remain vulnerable longer to shocks affecting their ability to service the mortgage loan (unemployment, divorce, ...), the future probability of default associated with these loans could increase somewhat compared to

historical experience. As shown in Chart 18, the annual default rate on mortgage loans amounted to only 0.24 p.c. in 2005, well below the corresponding rates recorded for other types of household loans.

Notwithstanding the sharp increase in Belgian households' liabilities since 2000 (Chart 14), the household sector's net wealth – measured as the difference between the value of households' real and financial assets and their liabilities – continued to increase in 2005, surpassing for the first time the peak attained in 1999 and approaching a level equivalent to almost eight times the sector's annual gross disposable income (Chart 19). In contrast to the previous high, which mainly resulted from the increasing value of the stock of financial assets, the most recent rise has also been driven to a large extent by the increase in the value of Belgian households' real estate assets.

The composition of financial assets held by Belgian households has also changed in recent years (Chart 20, left-hand panel). Historically, Belgian households placed the major share of their savings with banks. However, since 2004, the value of outstanding claims on institutional investors – the sum of financial assets invested in insurance products, pension funds and mutual funds – has exceeded

CHART 18 ANNUAL DEFAULT RATE ON DIFFERENT TYPES OF HOUSEHOLD LOANS⁽¹⁾ IN 2005
(Percentages)



Source : NBB.

(1) Annual default rate adjusted for the maturity of the types of credit and for the registration period in the negative Central Credit Register.

the value of the stock of households' investments in bank products. Indeed, during the last decade, the claims on institutional investors have increased steadily from 17.9 p.c. of total financial assets in 1994 to 41.2 p.c. in 2005. The net annual flows, eliminating valuation effects, indicate clearly that this rise resulted largely from funds invested in insurance products (including pension funds), but also in mutual funds (Chart 20, right-hand panel).

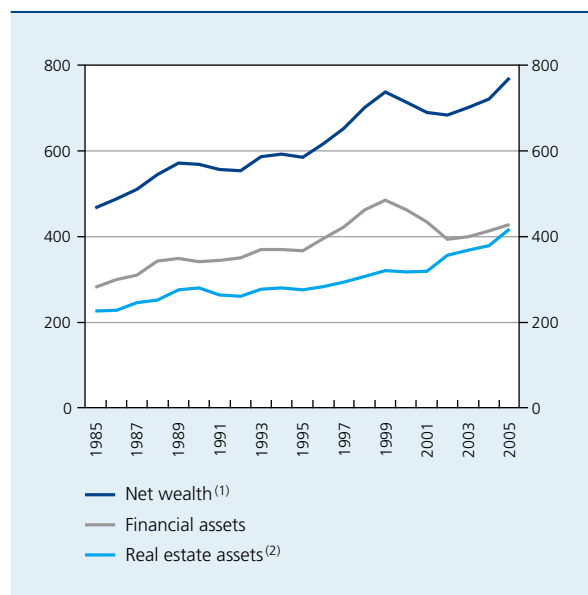
The success of these products can be attributed to various factors. First, households are increasingly focusing on longer term saving through individual and group life insurance and pension-savings funds. Second, these supplementary pension products often enjoy favourable tax treatment. In the case of pension-savings funds, the investment is deductible from households' taxable income up to a certain ceiling, which was increased, in 2005, from 620 euro to 780 euro per year and per person. Third, insurance and mutual funds products are becoming more flexible and varied so that they cater for households' saving needs in more diverse economic circumstances. Fourth, *bancassurance* groups present in Belgium are actively promoting those products through their network.

In contrast to the claims on institutional investors, the relative importance of households' claims on banks has decreased from 45.7 p.c. in 1994 to 33.6 p.c. in 2005.

During the recent period, the structural decline in the outstanding amount of bank bonds was offset by the growth of regulated savings deposits. But, the growth of the latter slowed down in 2004, and particularly in 2005, as most Belgian banks lowered the yield offered by this product in reaction to the decline in market interest rates (see also section 3.3). Although the direct intermediation of household sector savings by banks has decreased, those institutions still play a dominant role in the collection of funds from households, as the majority of life insurance and mutual funds products are sold through the large Belgian *bancassurance* groups.

These shifts in the structure of households' financial assets translated into a decrease in the proportion of financial assets for which risks are borne by financial intermediaries (see note to Chart 20). The share of these assets went down from 49.3 p.c. in 2004 to 48.8 p.c. in 2005, but is still quite high compared to the low point reached in 1999. After the increase recorded between 1999 and 2004 following the sharp correction in equity markets, this slight fall could indicate that Belgian households are adopting a slightly less risk-averse attitude.

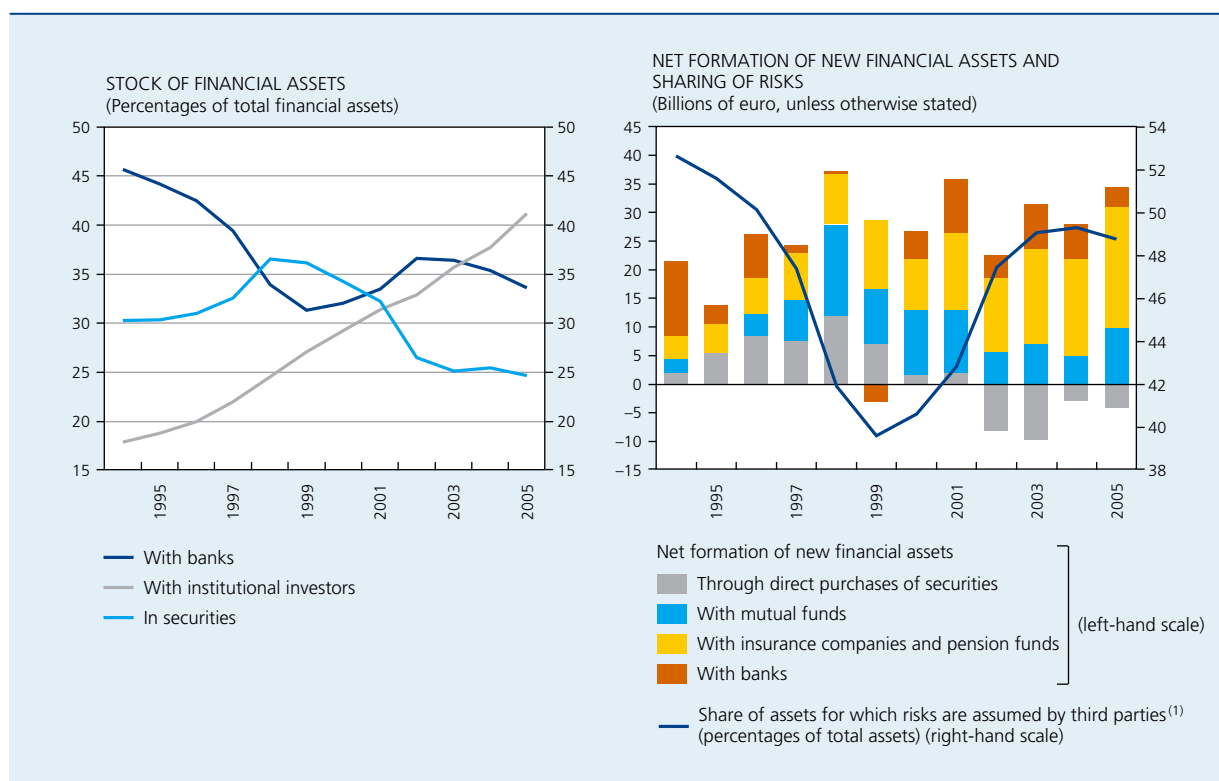
CHART 19 WEALTH OF THE BELGIAN HOUSEHOLD SECTOR
(Percentages of gross disposable income)



Sources : NSI, Rademaekers and Vuchelen (1998), Stadim, NBB.

(1) Net wealth is the difference between the real and financial assets held by households and their liabilities.

(2) For the years up to 1997, the stock of households' real estate assets, at market value, was taken from Rademaekers and Vuchelen (1998) "Het Belgische gezinsvermogen 1992-97", Bulletin de documentation / Documentatieblad, Federal Public Service Finance. Figures as from 1998 are obtained by applying the annual price and volume changes for the different categories of real estate assets to the 1997 figure.

CHART 20 BREAKDOWN OF BELGIAN HOUSEHOLDS' FINANCIAL ASSETS

Source : NBB.

(1) The share of assets for which risks are assumed by third parties is calculated as the sum of assets placed with banks and domestic pension funds and assets held in the form of class 21 life insurance policies, divided by the total of financial assets.

3. Banking sector

3.1 Profitability and solvency

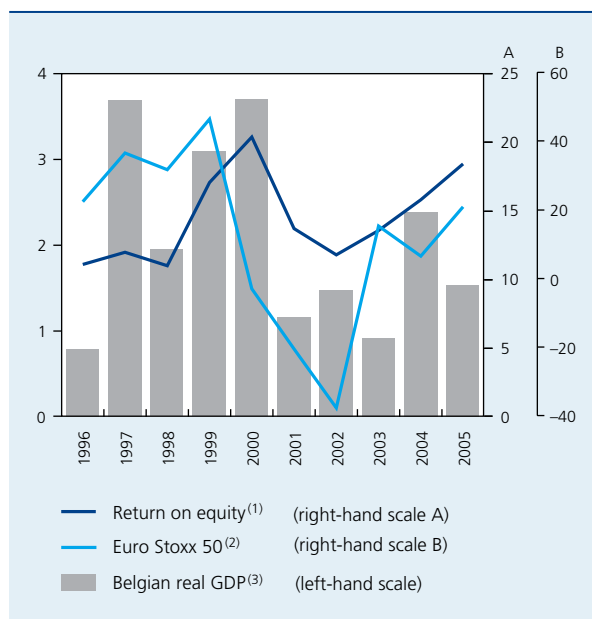
In 2005, the return on average equity of credit institutions under Belgian law rose for the third consecutive year to reach 18.5 p.c. (Chart 21). This is the highest level since 2000, when banks' profitability reached a peak of 20.4 p.c. Those recent developments have to be judged in the context of the traditionally high cyclicality of banks' results. The latter are strongly influenced, on the one hand, by GDP growth, which boosts interest income through an increased demand for bank loans and drives down provisions for credit risk and, on the other hand, by good financial market performance, which contributes to an increase in non-interest income.

While the second factor operated in 2005, the rise in banks' profitability was achieved despite a rather modest rise in Belgian GDP. However, as their activities are becoming more international, Belgian banks are increasingly dependent on global economic growth, which remained

vigorous in 2005. They also benefited from a further improvement in the quality of their credit portfolios. Value adjustments, which had started to decline in 2003, decreased further and actually turned negative in 2005, maintaining a strong growth differential between Belgian banks' net and gross operating results (Table 2). While this net withdrawal of value adjustments is largely due to the cancellation of the fund for general banking risks at one of the major Belgian banks in preparation for the introduction of IAS/IFRS, it also reflects a further decline in the cost of non-performing loans. However, in their published financial statements the major Belgian banks do remark that current provisioning levels are exceptional and that provisioning charges will start picking up again if the present very favourable credit environment deteriorates.

While cost-cutting had led to negative or slow growth of Belgian banks' operating costs over the last three years, those costs increased again significantly in 2005, mainly as a result of a 10 p.c. rise in non-staff expenses, due partly to an increase in commissions paid for financial services and to banks' independent agents. Nevertheless, the further increase in Belgian credit institutions' banking

CHART 21 CYCLICALITY OF THE RESULTS OF CREDIT INSTITUTIONS UNDER BELGIAN LAW
(Percentages)



Sources: Thomson Financial Datastream, CBFA, NBB.

(1) Consolidated figures, level in percentages.

(2) End of year annual percentage changes.

(3) Annual percentage changes.

income, which had already picked up in 2004 after three years of sluggish or negative growth largely compensated for the rise in operating costs. As a result, cost efficiency only deteriorated slightly; the cost-income ratio went up from 72 p.c. in 2004 to 72.6 p.c. in 2005.

The rise in banking income was due exclusively to the increase in Belgian banks' net non-interest income, which rose by a hefty 12.6 p.c. in 2005. The main component of this category of income consists of fees and commissions. These went up by 8.4 p.c., boosted by good results in asset management, securities transactions and the sale of life insurance products via the banking network (Table 3). Indeed, in their published financial statements, the major Belgian banks report strong increases in the volume of assets under management, both for institutional investors and for households. The higher sales of life insurance products can be related to increased cross-selling in the *bancassurance* groups to which the four major Belgian credit institutions belong.

Good conditions on financial markets contributed to the surge in the trading and foreign exchange result, which rose by 19.5 p.c. Conversely, the realisation of capital gains on the investment portfolio fell by 37.6 p.c. The latter category of income, which has been fluctuating widely in recent years, is linked to the valuation of banks'

TABLE 2 MAJOR COMPONENTS OF THE INCOME STATEMENT OF BELGIAN CREDIT INSTITUTIONS⁽¹⁾
(Consolidated figures, percentage changes compared to the previous year, unless otherwise stated)

	1999	2000	2001	2002	2003	2004	2005	p.m. Billions of euro 2005
Banking income	14.0	15.3	1.4	-4.6	-1.2	5.9	5.5	25.5
Net interest income	10.4	3.0	4.6	3.2	0.0	5.2	-0.9	12.7
Net non-interest income	18.3	28.5	-1.2	-11.7	-2.6	6.7	12.6	12.8
Operating costs	21.1	19.0	4.1	-3.8	-1.8	3.1	6.3	18.5
Staff costs	15.6	11.7	6.7	-0.5	0.8	1.4	1.7	7.9
Other operating costs	26.0	24.9	2.3	-6.3	-4.1	4.5	10.0	10.6
Gross operating result	0.3	6.8	-5.6	-6.9	0.1	13.8	3.4	7.0
Value adjustments	-24.9	-9.6	4.6	36.2	-31.3	-69.2	— ⁽²⁾	-0.4
Net operating result	13.4	12.3	-8.3	-20.2	15.3	41.5	18.4	7.4
p.m. Cost-income ratio (level in percentages)	69.9	72.2	74.1	74.7	73.9	72.0	72.6	—

Sources: CBFA, NBB.

(1) In order to avoid the major impact on the income statement of the transfer of the participating interest in Dexia Banque Internationale de Luxembourg (BIL) from Dexia Bank Belgium to Dexia Group, 2003 percentage changes were calculated using published figures from Dexia Group instead of supervisory data on Dexia Bank Belgium.

(2) The percentage change in value adjustments for 2005 is not applicable as the net addition of value adjustments in 2004 turned into a net withdrawal of value adjustments in 2005.

TABLE 3 NET NON-INTEREST INCOME OF BELGIAN CREDIT INSTITUTIONS⁽¹⁾

(Consolidated figures, percentage changes compared to the previous year, unless otherwise stated)

	1999	2000	2001	2002	2003	2004	2005	p.m. Billions of euro 2005
Fee income	37.0	41.0	-4.0	-9.0	-1.5	10.2	8.4	7.9
Trading result ⁽²⁾	-35.4	181.6	-8.3	-40.0	1.5	15.8	19.5	1.4
Realisation of capital gains on the investment portfolio	-23.3	-46.6	43.5	-5.4	7.5	-25.9	-37.6	0.5
Other	60.5	4.8	-2.2	-3.1	-6.6	9.2	39.3	3.0
Total net non-interest income	18.3	28.5	-1.2	-11.7	-2.6	6.7	12.6	12.8

Sources: CBFA, NBB.

(1) In order to avoid the major impact on the income statement of the transfer of the participating interest in Dexia Banque Internationale de Luxembourg (BIL) from Dexia Bank Belgium to Dexia Group, 2003 percentage changes were calculated using published figures from Dexia Group instead of supervisory data on Dexia Bank Belgium.

(2) Including foreign exchange results.

securities under Belgian GAAP, which were still the basis for the 2005 supervisory data used for the analysis in this chapter. These accounting principles require securities in the investment book of Belgian banks to be recorded at amortised cost, which leads to the building up of latent capital gains (or losses). By selling, before maturity, securities, acquired in the past at lower market prices, banks may realise part of these latent gains.

The new accounting principles, IAS/IFRS, will significantly affect the valuation of banks' financial assets. Those new rules will have to be applied to the consolidated prudential reporting schemes of all Belgian banks as from 2006. However, the major Belgian *bancassurance* groups have

already drawn up their consolidated published accounts according to IAS/IFRS since 2005. Table 4 uses consolidated published accounts of two major Belgian financial groups to illustrate the difference in the classification of financial instruments under Belgian GAAP and IAS/IFRS.

Apart from loans and receivables, a financial group is only allowed to value its assets and, in particular, its securities, at amortised cost if they are "held to maturity", but very strict conditions apply here. More specifically, if, in two consecutive years, more than an insignificant part of a group's held to maturity portfolio is sold or reclassified, the group in question is forbidden to hold such a portfolio for two years. As a result, financial instruments classified

TABLE 4 CLASSIFICATION OF FINANCIAL INSTRUMENTS UNDER BELGIAN GAAP AND IAS/IFRS(End of 2004 consolidated figures, percentages of total financial instruments, weighted average for Fortis Group and KBC Group⁽¹⁾)

Belgian GAAP		IAS/IFRS		Valuation
Loans and receivables	58.7	Loans and receivables	55.9	Amortised cost
Investment securities	31.6	Loans and securities held to maturity	2.0	Amortised cost
Trading securities	9.7	Loans and securities held for trading ⁽²⁾ or designated at fair value through profit and loss	16.6	Fair value through profit and loss
		Loans and securities available for sale	25.5	Fair value through equity

Sources: Published accounts of Fortis Group and KBC Group.

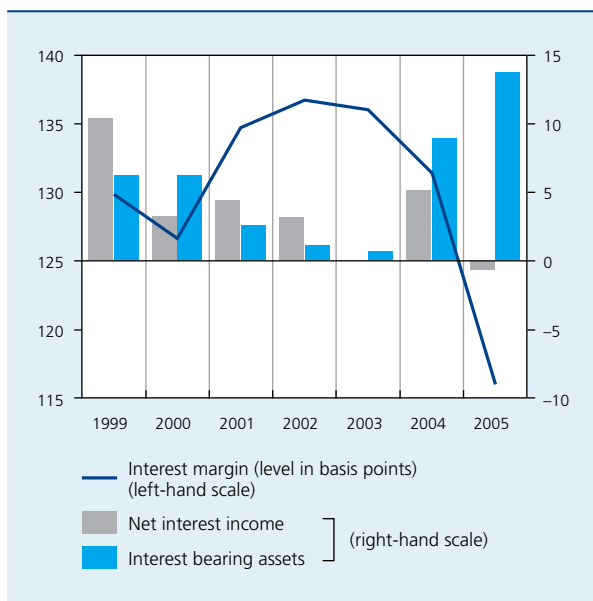
(1) Average weighted according to the balance sheet total.

(2) The "held for trading" portfolio also includes derivative positions which were not recorded in the balance sheet under Belgian GAAP.

CHART 22

BELGIAN BANKS' INTEREST MARGIN^{(1) (2)}

(Consolidated figures, percentage changes compared to the previous year, unless otherwise stated)



Sources: CBFA, NBB.

(1) In order to avoid the major impact on the income statement of the transfer of the participating interest in Dexia Banque Internationale de Luxembourg (BIL) from Dexia Bank Belgium to Dexia Group, 2003 percentage changes were calculated using published figures from Dexia Group instead of supervisory data on Dexia Bank Belgium.

(2) 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.

as held to maturity by the two largest Belgian financial groups accounted for only 2 p.c. of total financial instruments under IAS/IFRS at the end of 2004, compared to a percentage of 31.6 p.c. for the investment portfolio under Belgian GAAP.

At the end of 2004, a large share of the financial assets of the two major Belgian financial groups was held as "available for sale" under IAS/IFRS. Assets in this portfolio, which do not consist exclusively of securities, but also include some marketable loans and receivables, are booked at fair value, and capital gains or losses on these instruments are explicitly recognised in equity, without going through the profit and loss account. It is only for loans and securities "designated at fair value through profit and loss" and "held for trading" that such gains or losses are recorded through this account.

In contrast to the improvement in Belgian banks' net non-interest income, banks' net interest income decreased for the first time since 1997. The protracted low interest rate environment and increased competition between banks led to a further contraction of banks' interest

margin, which went down from 131 basis points in 2004 to 116 basis points in 2005 (Chart 22). As the strong increase in banks' interest bearing assets (13.8 p.c.) was boosted *i.a.* by a rise in interbank transactions – which are low-margin activities – this gain in volume could not compensate for the fall in margin.

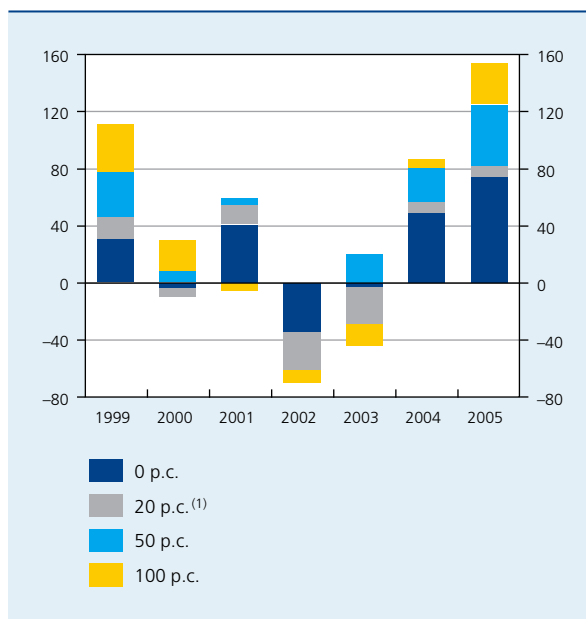
The increase in Belgian banks' interbank activities is also evident from an analysis of banks' risk weighted assets, which are currently still calculated according to the Basel I framework. Since Belgian banks' interbank transactions are increasingly secured by collateral, most of them in the form of government securities, the growth of these activities has led to an increase in the Basel I 0 p.c. risk weight class since 2004 (Chart 23).

However, the total outstanding amount of loans with a 100 p.c. weight, comprising the majority of loans granted to corporations, has also been going up since 2004, after a continuous decline between 2001 and 2003. In 2005, the increase in these loans even accelerated, driven by a strong rise in loans to non-residents, reflecting not only organic growth but also a further international expansion of the major Belgian banks. Nevertheless, the growth of the loans with a risk weight of 100 p.c. remained well

CHART 23

CHANGE IN ASSETS OF CREDIT INSTITUTIONS UNDER BELGIAN LAW ACCORDING TO THE BASEL I RISK WEIGHT COEFFICIENTS FOR CREDIT RISK REQUIREMENTS

(Consolidated figures, end of year changes, billions of euro)

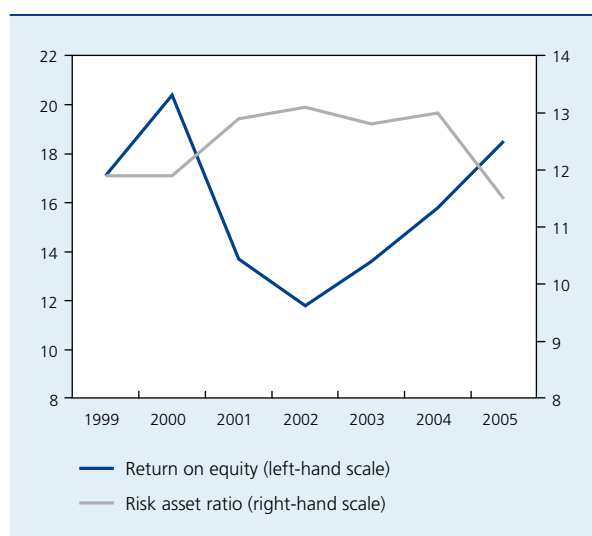


Sources: CBFA, NBB.

(1) Including the risk classes with a risk weight factor of 4 and 10 p.c.

CHART 24 RETURN ON EQUITY AND RISK ASSET RATIO OF CREDIT INSTITUTIONS UNDER BELGIAN LAW

(Consolidated figures, percentages)



Sources: CBFA, NBB.

below that of the loans with a 50 p.c. weight, the rise of the latter being largely driven by the strong increase in mortgage credit over the last few years.

Credit risks are by far the major determinants of total capital requirements of Belgian banks under Basel I, as they make up 93 p.c. of these requirements, the balance being linked to market risks. In 2005, the strong expansion of credit risk bearing assets led to a significant rise in overall capital requirements (13.3 p.c.) which was much stronger than the growth of banks' regulatory capital (0.6 p.c.). As a result, the risk asset ratio went down from 13 p.c. at the end of 2004 to 11.5 p.c. at the end of 2005 (Chart 24).

This change in the solvency ratio has to be viewed in the context of the shortcomings of Basel I, which only imperfectly measures the credit risks associated with the various categories of assets. The more risk sensitive approach of Basel II will reflect much more closely the true riskiness of Belgian banks' balance sheets.

The reduction in the Basel I risk asset ratio stands in sharp contrast with the strong increase in Belgian banks' return on equity, which rose from 15.8 p.c. in 2004 to 18.5 p.c. in 2005. These two movements are clearly connected, as increased recourse by banks to financial leverage, while leading to a deterioration in the solvency position, will at the same time push up profitability.

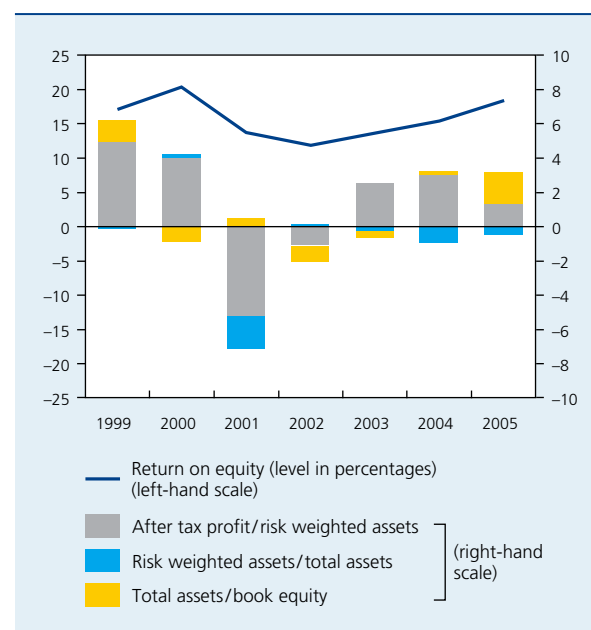
In fact, the change in the return on equity can be broken down into three factors, *i.e.* the change in the risk adjusted return on assets as measured by the variation in after tax profit divided by risk weighted assets, the change in the average riskiness of assets, estimated by the change in the ratio of risk weighted assets to total assets, and the change in the financial leverage, corresponding to the change in total assets as a percentage of book equity (Chart 25).

$$\begin{aligned} \text{Return on equity} &= \frac{\text{after tax profit}}{\text{risk weighted assets}} \times \frac{\text{risk weighted assets}}{\text{total assets}} \times \frac{\text{total assets}}{\text{book equity}} \\ &= \text{risk adjusted return on assets} \times \text{average riskiness of assets} \times \text{financial leverage} \end{aligned}$$

In 2005, the change in the first of those three components accounted for less than half of the increase in the return on equity, the main driver of the improvement in profitability having been the increase in financial leverage. The third factor, *i.e.* the change in Belgian banks' risk profile, points to a slight reduction in the average riskiness of assets, generating a small negative impact on banks' profitability. Between 1999 and 2005, the ratio of risk weighted assets to total assets went down from 43.9 p.c. to 35.5 p.c. While those percentages are subject to the above-mentioned imperfections of Basel I, they illustrate

CHART 25 BREAKDOWN OF CHANGES IN THE RETURN ON EQUITY OF CREDIT INSTITUTIONS UNDER BELGIAN LAW

(Consolidated figures, percentage contributions to changes in the return on equity, unless otherwise stated)



Sources: CBFA, NBB.

a key characteristic of Belgian banks' balance sheets, *i.e.* the large proportion of low-risk assets, such as (secured) interbank loans, government bonds and a large portfolio of loans secured by mortgages.

As noted by the IMF in its recent Financial Sector Assessment Program (FSAP) for Belgium, this cautious attitude towards risk combined with a stable source of funding contributes to the resilience of the banking sector and helps to underpin stability. While, according to the IMF, this limits the near-term vulnerability of Belgian banks, increased cross-border operations and closer links to the global money centres are raising medium-term challenges which could become more apparent with a downturn in the business cycle. The main conclusions of the FSAP mission in Belgium are summarised in Box 3.

3.2 Credit risk

3.2.1 Structure of Belgian banks' assets

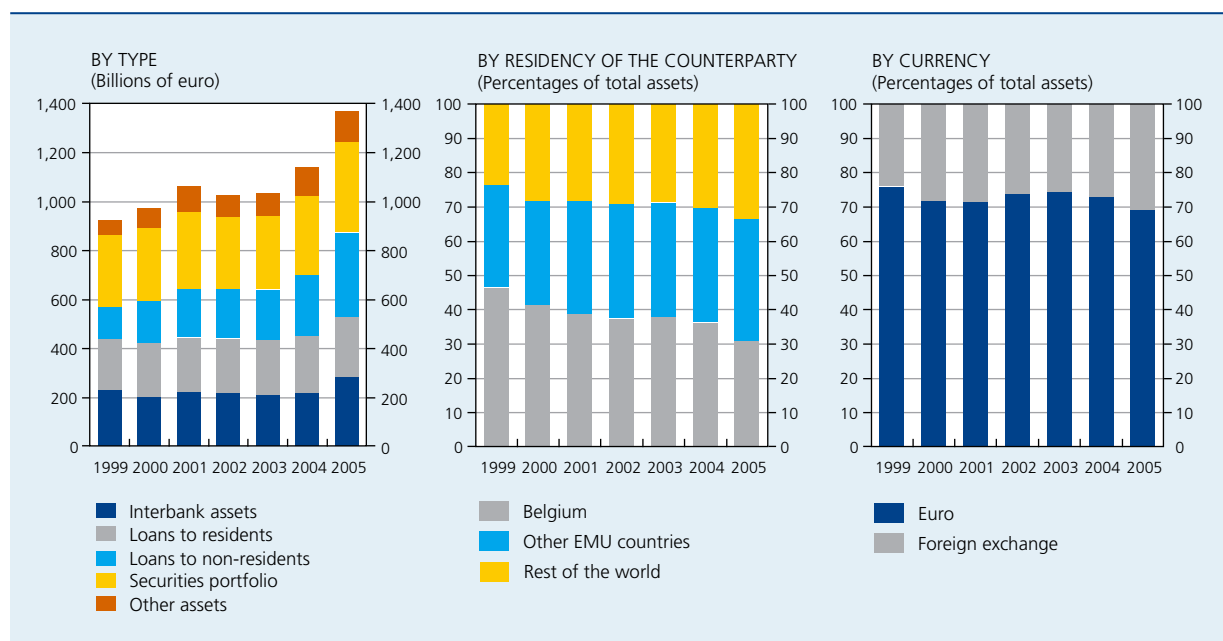
After a period of relatively flat growth, the balance sheet total of Belgian banks expanded very strongly between the end of 2003 and the end of 2005, going up by 32.4 p.c. to 1,369 billions of euro at the end of 2005 (Chart 26).

As already explained, part of this increase was the result of a rise in interbank transactions, which went up by 71 billions of euro between 2003 and 2005. However, the strongest growth occurred in the Belgian banks' loan portfolio, which was swelled by 162 billions of euro between 2003 and 2005, accounting for about half of the increase in banks' total assets. This expansion was largely due to the rise in the outstanding amount of Belgian banks' loans to non-residents, which, since 2004, has exceeded the amount of loans to residents.⁽¹⁾

Limited growth opportunities in the Belgian banking market have increasingly led Belgian banks to develop their activities abroad. At the end of 1999, about half of Belgian banks' total assets was still on Belgian counterparties, but this share declined to 30.9 p.c. in 2005, with claims on counterparties residing in other EMU countries and the rest of the world each representing about one third of Belgian banks' total assets at the end of 2005. The increasing internationalisation of Belgian banks' balance sheets is also illustrated by a resumption in the growth of the share of assets denominated in foreign currency, which represented 31 p.c. at the end of 2005 compared to the low point of 24.1 p.c. reached in 1999 after the introduction of the euro.

(1) A substantial part of the increase in Belgian banks' loans to non-residents is related to quasi interbank transactions (such as reverse repo agreements) between a Belgian credit institution and foreign non-bank financial corporations.

CHART 26 BREAKDOWN OF BELGIAN BANKS' ASSETS
(End of year consolidated figures)



Sources: CBFA, NBB.

Box 3 – Belgium’s Financial System Stability Assessment by the IMF

In 2004 and 2005, an IMF-led team of financial experts undertook a comprehensive evaluation of the Belgian financial system in the framework of its Financial Sector Assessment Program (FSAP). The report setting out the main findings of this thorough appraisal and the associated recommendations (the so-called Financial System Stability Assessment) can be found on the IMF’s website.

The first FSAP mission (December 2004) focused mainly on the assessment of the degree of observance of five internationally accepted financial sector standards and codes: the Basel Core Principles for Effective Banking Supervision, the IAIS Insurance Core Principles, the IOSCO Principles of Securities Regulation, the CPSS/IOSCO Recommendations for Securities Settlement Systems, and the standards with respect to Anti-Money Laundering and Combating the Financing of Terrorism. The Belgian supervisor was found to observe a high degree of compliance with these international standards, although some weaknesses were identified in the insurance and pension fund areas; these are in the process of being addressed. Other structural underpinnings of financial stability – such as systemic liquidity arrangements, the institutional and legal framework for crisis management, and transparency and governance structures – were also examined.

The second FSAP mission (March 2005) focused on the macroprudential strengths and potential weaknesses of the Belgian financial system, which is dominated by a few internationally active *bancassurance* conglomerates. It entailed the examination of a wide range of financial soundness indicators and included the execution of a number of stress tests by individual financial institutions (bottom-up stress tests) and by the authorities (top-down stress tests on the basis of supervisory data). The results of these stress tests confirmed the resilience of the Belgian financial system to macroeconomic shocks, with stability being underpinned by a number of Belgium-specific features, such as the large holdings of government securities, banks’ stable sources of funding and the traditionally cautious attitude toward risk. While the near-term risks to the generally resilient and well-supervised financial system were found to be moderate and well understood by the supervisors, the report also identified a number of potential challenges for the authorities in the future, such as those related to the increased complexity and evolving strategies of the *bancassurance* groups, the system’s openness and related large cross-border activities, and the presence of a large volume of guaranteed rate contracts in the life insurance sector.

Against this background, the IMF’s main macroprudential recommendation – to ensure the preservation of Belgium’s “enviable track record of financial stability” – focused on the need for authorities to maintain vigilance over the financial sector’s expansion abroad and to ensure that the capacity to identify and address risks in the financial system keeps pace with the rapidly evolving market and increased complexity of financial groups, *i.a.* by more regularly performing stress tests.

The international orientation of Belgian banks is most obvious from their interbank activities, of which 86.6 p.c. were contracted with foreign counterparties at the end of 2005 (Table 5). The highly integrated euro area interbank market accounted for 45.2 p.c. of interbank claims. Similar observations can be made with regard to the Belgian banks’ securities portfolio, which largely consists of bonds issued by governments of other EMU countries. On the other hand, while Belgian banks’ loans to non-residents have been rising sharply over the last two years, at the end of 2005, loans to Belgian customers still represented 246 billions of euro, or more than 40 p.c. of the total loan portfolio. Belgian banks’ exposures respec-

tively to residents and non-residents are analysed in more detail in the following two subsections.

3.2.2 Exposures to residents

While the analysis in this chapter is largely based on consolidated data, a more refined breakdown of Belgian banks’ claims on residents – which amounted to 423 billions of euro at the end of 2005 – is only possible on a territorial basis. Nevertheless, those territorial data provide a good proxy of total positions on residents, as exposures to Belgian counterparties are mainly concentrated in the banks’ Belgian offices.

TABLE 5

BREAKDOWN OF BELGIAN BANKS' ASSETS

(End of 2005 consolidated figures, percentages of the total balance sheet item, unless otherwise stated)

	<i>p.m.</i> Billions of euro	By residency of the counterparty			By currency	
		Belgium	Other EMU countries	Rest of the world	Euro	Foreign exchange
Interbank assets	282	13.4	45.2	41.4	63.1	36.9
Loans and advances to customers	591	41.6	25.5	32.9	67.3	32.7
Mortgage loans	157	56.4	40.3	3.3	96.7	3.3
Term loans	324	35.6	15.6	48.8	53.1	46.9
Other	111	38.2	33.4	28.4	67.6	32.4
Securities portfolio	368	19.7	49.4	30.9	72.9	27.1
Other assets	128	52.3	21.1	26.6	78.7	21.3
Total assets	1,369	30.9	35.6	33.5	69.0	31.0
<i>p.m. Total assets in billions of euro</i>		423	487	459	945	424

Sources: CBFA, NBB.

As mentioned above, the bulk of banks' interbank activities is contracted with foreign counterparties. However, exposures to the Belgian banking sector still represented 46 billions of euro, or 12.9 p.c. of total claims on Belgian counterparties, at the end of 2005 (Chart 27). Banks' positions on other Belgian financial institutions represented 7 p.c. of the total. Although outstanding claims on the Belgian government, which largely take the form of government bonds, have declined continuously in recent years, they still represented 25.2 p.c. of banks' exposures to residents at the end of 2005.

More than half of Belgian banks' claims on residents consists of exposures to the non-financial private sector. In this category, loans to Belgian households accounted for 113 billions of euro at the end of 2005, after a sharp increase over the last four years. This rise was largely due to the strong growth of mortgage loans extended to Belgian households, against the background of rising house prices and continuously declining interest rates. At the end of 2005, those loans totalled 87 billions of euro. A more detailed analysis of this market is provided in Chapter 2.

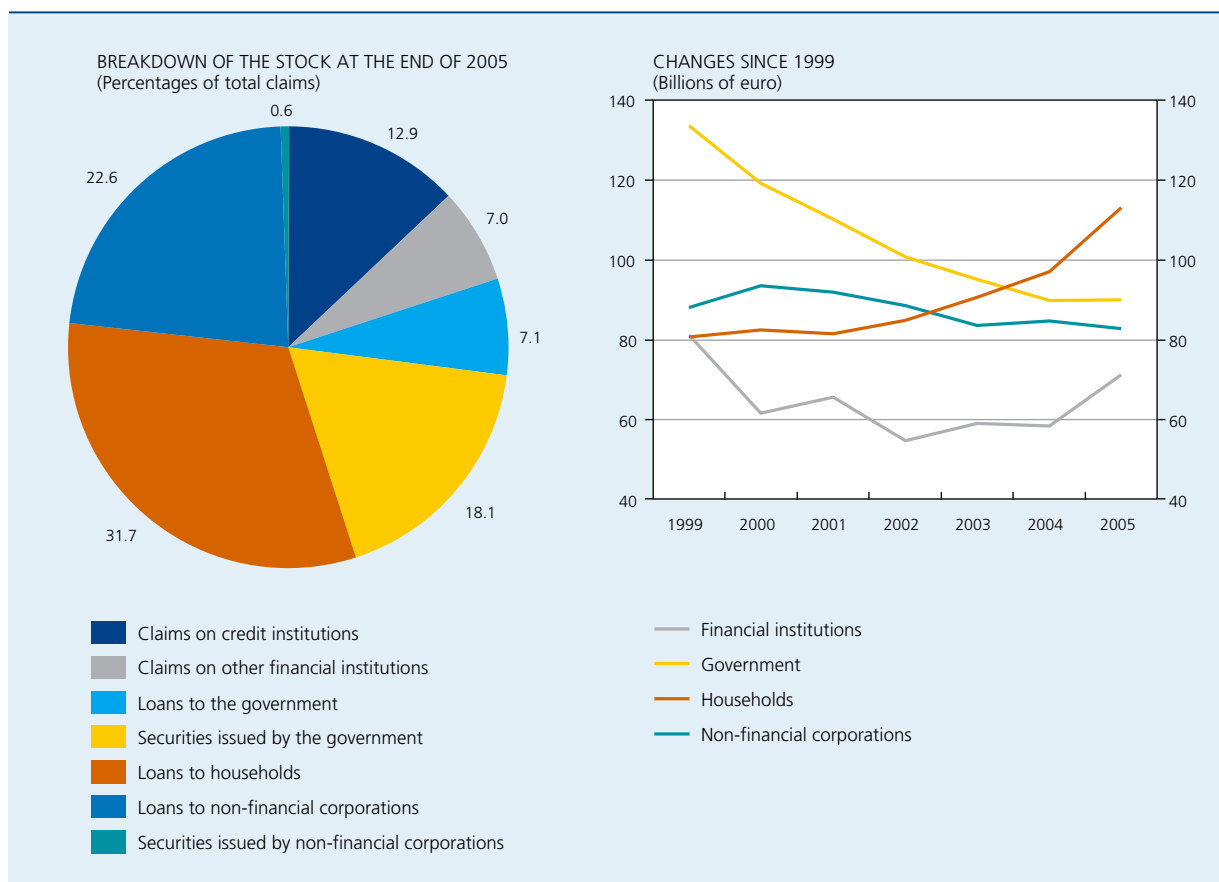
Compared to mortgage credit, consumer credit represents a much smaller fraction of banks' total lending to Belgian households, accounting for only 8 billions of euro at the end of 2005. Nevertheless, after a decline in 2004, this type of lending again made a positive contribution to the growth of loans to households, and the most recent data show that consumer credit at Belgian banks has risen

further in the first quarter of 2006. Similarly, term loans to the household sector, which mainly consist of loans extended to the self-employed, started increasing again in 2005 after a long period of negative growth. At the end of 2005, they amounted to 15 billions of euro.

Since 2003, loans to the Belgian household sector have exceeded claims on the Belgian corporate sector, which amounted to 81 billions of euro at the end of 2005. These claims on the corporate sector mainly take the form of loans, as banks' outstanding amount of securities issued by Belgian non-financial corporations amounted to only 2 billions of euro at the end of 2005. However, exposures to the Belgian non-financial corporate sector remain substantial. In order to assess the quality of this loan portfolio, a so-called "debt-at-risk" has been calculated for Belgian banks' loans to Belgian non-financial corporations.

The National Bank of Belgium has developed a bankruptcy rate model using annual accounts in the Central Balance Sheet Office. This model was estimated on a sample of non-financial corporations employing at least two persons or having an annual sales figure of at least 150,000 euro, and is based on various financial ratios, mainly reflecting corporations' liquidity and solvency position. From this model, individual cumulative probabilities of bankruptcy for a three-year horizon can be deduced for the whole population of Belgian non-financial corporations.

CHART 27 BELGIAN BANKS' CLAIMS ON RESIDENTS⁽¹⁾
(Territorial figures)



Sources: CBFA, NBB.

(1) Including loans, securities and participations.

On the basis of these individual probabilities of bankruptcy (PB_i) and the corresponding individual amounts of bank loans (D_i) recorded in the Central Credit Register, a debt-at-risk has been calculated in order to assess the credit quality of Belgian banks' portfolio of loans to Belgian non-financial corporations. This debt-at-risk measure is calculated as follows:

$$\text{debt-at-risk} = \frac{\sum_{i=1}^n PB_i \times D_i}{\sum_{i=1}^n D_i}, \text{ where } n \text{ is the number of}$$

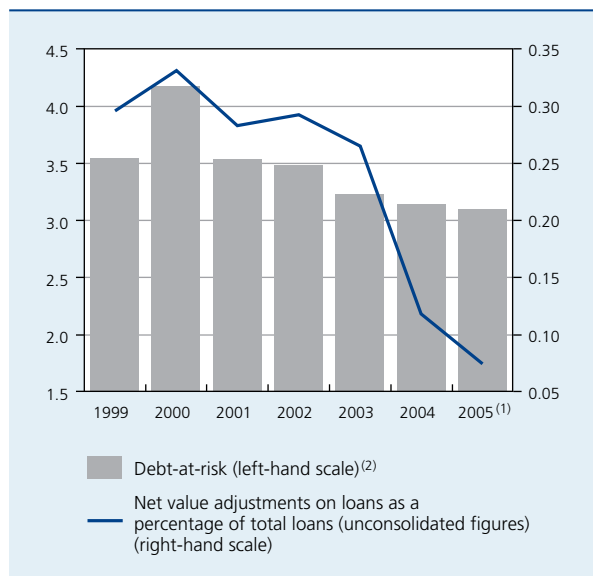
corporations granted bank credit (and recorded as such in the Central Credit Register)

The debt-at-risk in a given year is the weighted average cumulative probability of bankruptcy over the next three years of the individual loans in the loan portfolio. After a peak of 4.2 p.c. in 2000 – mainly related to exposures

on the TMT sector – the debt-at-risk has decreased continuously to reach 3.1 p.c. in 2005, suggesting that the credit risk related to Belgian non-financial corporations has improved over the last few years (Chart 28). This movement in the debt-at-risk tracks the dynamic of the net value adjustments on loans of Belgian banks on an unconsolidated basis.

Another way to present the results of the debt-at-risk analysis is to examine the frequency distribution of the estimated individual probabilities of bankruptcy within the population. The upper panel of Chart 29, which presents this distribution by number of firms, shows a relative stability, with the major proportion of firms having a three-year cumulative probability of bankruptcy between 0 and 2 p.c. As a result of the recent improvement in Belgian non-financial corporations' profitability and solvency (see section 2.1), the proportion of companies in this category increased from 39.2 p.c. in 1999 to 44.8 p.c. in 2004.

CHART 28 DEBT-AT-RISK OF BELGIAN BANKS
(Territorial figures, percentages)



Sources: CBFA, NBB.

(1) The 2005 figures combine the cumulative probabilities of bankruptcy in 2004 with the exposures in 2005.

(2) The debt-at-risk in a given year is the weighted average three-year cumulative probability of bankruptcy of the individual loans in the loan portfolio of Belgian banks.

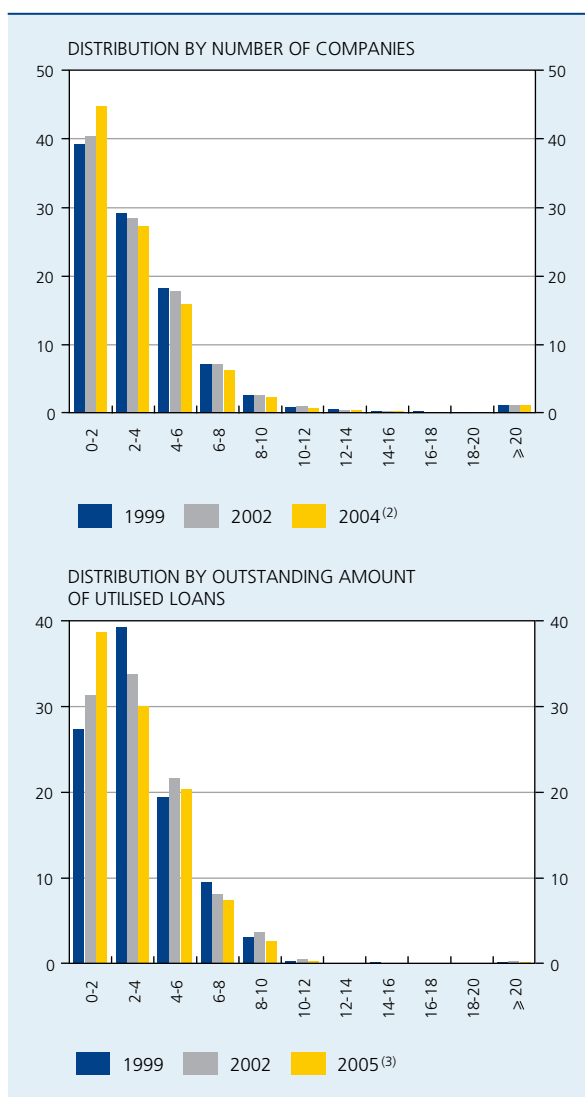
In the lower panel of Chart 29, the estimated probabilities of bankruptcy are weighted according to the outstanding amount of credit. In this case, the changes are somewhat more pronounced. The proportion of loans contracted with companies in the failure range of 0-2 p.c. increased from 27.5 p.c. in 1999 to 38.7 p.c. in 2005.

3.2.3 Exposures to non-residents

Belgian banks' detailed prudential reporting on foreign exposures allows for a more in-depth analysis of their exposures to non-residents (Table 6). While these data only cover credit institutions under Belgian law, they nevertheless account for about 95 p.c. of Belgian banks' total foreign assets as reported in Table 5. As Table 6 illustrates, Belgian banks' foreign claims (securities and loans) amounted to 799 billions of euro at the end of 2005. However, a substantial part of foreign exposures is recorded off-balance-sheet, *i.e.* banks' derivative contracts (mainly interest rate swaps) and guarantees extended to foreign counterparties. These off-balance-sheet positions accounted for 193 billions of euro at the end of 2005, or 19.5 p.c. of Belgian banks' total foreign exposures.

The majority of foreign exposures is on other EMU and developed countries, representing 857 billions of euro or 86.3 p.c. of total foreign exposures at the end of

CHART 29 FREQUENCY DISTRIBUTION OF ESTIMATED CUMULATIVE PROBABILITIES OF BANKRUPTCY OF BELGIAN NON-FINANCIAL CORPORATIONS⁽¹⁾
(Territorial figures, percentages)



Source: NBB.

(1) Only for non-financial corporations granted bank credit. The value 0-2 on the x-axis indicates that the companies within this range have an estimated three-year cumulative probability of bankruptcy higher than 0 and lower than 2 p.c.

(2) The 2005 figures are not reported as the latest available accounts in the Central Balance Sheet Office pertain to 2004.

(3) The 2005 figures combine the cumulative probabilities of bankruptcy in 2004 with the exposures in 2005.

2005. The bulk of these exposures is on counterparties in Belgium's neighbouring countries and in Italy, the UK and the US. Nevertheless, Belgian banks have been gradually building up their positions in Central and Eastern Europe, which rose to 77 billions of euro at the end of 2005. The share of banks' exposures to off-shore centres and emerging countries in total banks' foreign exposures remains limited. They nevertheless amounted, at the end of 2005, to 38 and 21 billions of euro respectively.

TABLE 6 FOREIGN EXPOSURES OF CREDIT INSTITUTIONS UNDER BELGIAN LAW⁽¹⁾

(End of 2005 consolidated figures, billions of euro, unless otherwise stated)

	Total	EMU and other developed countries	Central and Eastern Europe	Off-shore centres	Emerging countries
On-balance-sheet					
Claims (loans and securities)	798.7	699.8	49.6	32.1	17.2
Off-balance-sheet⁽²⁾					
Derivative contracts	111.0	87.2	22.4	1.0	0.3
Extended guarantees	82.4	69.5	4.6	4.6	3.7
Total foreign exposures	992.1	856.5	76.6	37.7	21.2
<i>p.m. In percentage of Belgian banks' total foreign exposures</i>	<i>100.0</i>	<i>86.3</i>	<i>7.7</i>	<i>3.8</i>	<i>2.1</i>

Sources: CBFA, NBB.

(1) Figures are on an ultimate risk basis, i.e. after risk transfers.

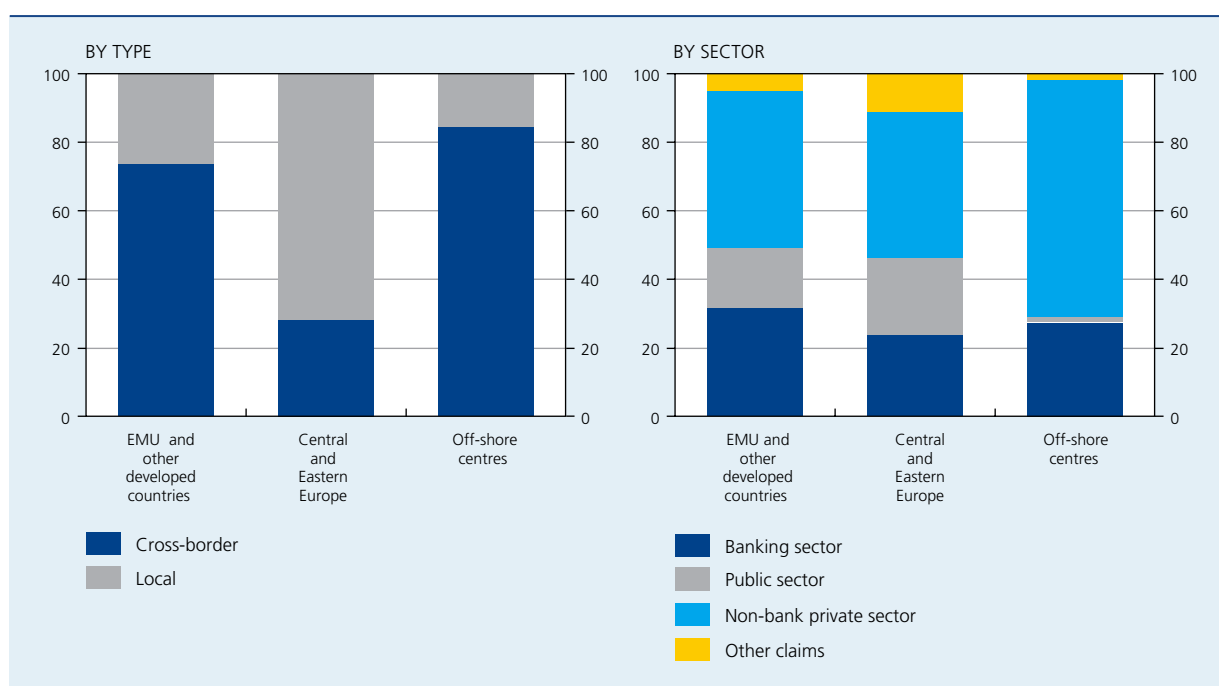
(2) Derivatives are recorded at market value, extended guarantees are recorded at book value.

If the analysis is focused on on-balance-sheet positions, a more detailed breakdown of banks' claims is possible. Chart 30 presents, per geographical region, a breakdown of foreign claims by type and sector.

About 75 p.c. of the claims on other EMU and developed countries consist of securities acquired and loans extended on a cross-border basis. The counterparties of these claims can be divided into three main sectors: the banking sector, the public sector and the non-bank

CHART 30 BREAKDOWN OF FOREIGN CLAIMS OF CREDIT INSTITUTIONS UNDER BELGIAN LAW⁽¹⁾

(End of 2005 consolidated figures, percentages of total foreign claims)



Sources: CBFA, NBB.

(1) Figures are on an ultimate risk basis, i.e. after risk transfers.

private sector, which respectively accounted for 31.5 p.c., 17.8 p.c. and 45.6 p.c. of total foreign positions in developed countries. As regards Belgian banks' interbank positions in these countries, the major share of these claims is concentrated in Germany, France and the United Kingdom. In fact, banks' interbank claims are highly concentrated in developed countries, which accounted for more than 90 p.c. of total foreign claims on the banking sector at the end of 2005. Positions in the public sector, on the other hand, mostly consist of Belgian banks' holdings of Italian government bonds. Finally, claims on the private sector are concentrated in the United Kingdom, the United States and the Netherlands, the latter reflecting the strong presence of some Belgian banks in the Dutch mortgage market.

In contrast to the positions of Belgian banks in developed countries, local claims account for the bulk of loans and securities on counterparties in Central and Eastern Europe.

At the end of 2005, local claims on these countries represented about 70 p.c. of total claims. Some major Belgian banks have in fact been building up a local presence in Central and Eastern Europe. KBC, in particular, accounts for a large share of Belgian banks' positions in the Czech Republic, Hungary and Poland. According to its published financial statements, KBC's local banking network in Central Europe comprised just over 1,000 branches at the end of 2005. By buying out minority interests, KBC further strengthened its presence in these countries in 2005.

Fortis, on the other hand, acquired a significant position in Turkey following its acquisition of the Turkish Disbank in July 2005. However, this major Belgian bank is also present in other Central and Eastern European countries, as is Dexia, which continued to reinforce its position in Central Europe with the creation of Dexia Kommunalkredit Bank in March 2005. Dexia Kommunalkredit Bank is a joint subsidiary of Dexia and Kommunalkredit Austria, created in order to run external growth projects in the countries of Central Europe and the Balkans, such as Slovakia, the Czech Republic, Hungary and Poland.

Claims on Central and Eastern European countries are mostly on the non-bank private sector, which accounted for 42.6 p.c. of total claims on these countries. Loans and securities on the banking sector and the public sector represented 23.7 p.c. and 22.5 p.c. respectively end 2005.

Belgian banks' positions in off-shore centres are mainly in the non-bank private sector (69.1 p.c.) and are highly concentrated in the Cayman Islands and Hong Kong,

which together accounted for 70.6 p.c. of total positions in these countries at the end of 2005. Part of these claims may be related to banks' exposures to the hedge fund industry, which is, to a large extent, operating from off-shore financial centres.

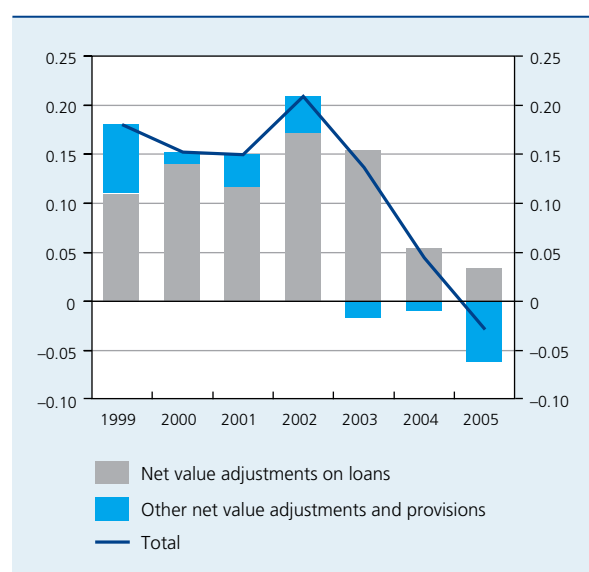
3.2.4 Quality of the loan portfolio

The overall good quality of Belgian banks' credit portfolio is illustrated by the decline in value adjustments for non-performing loans (Chart 31).

As pointed out in section 3.1, value adjustments for bad loans started to decline in 2003, and were further reduced sharply in 2004 and 2005. Thanks to an exceptional factor, *i.e.* the cancellation of the fund for general banking risks at one of the major Belgian banks in preparation for the introduction of IAS/IFRS, the flow of banks' value adjustments and provisions actually turned negative in 2005.

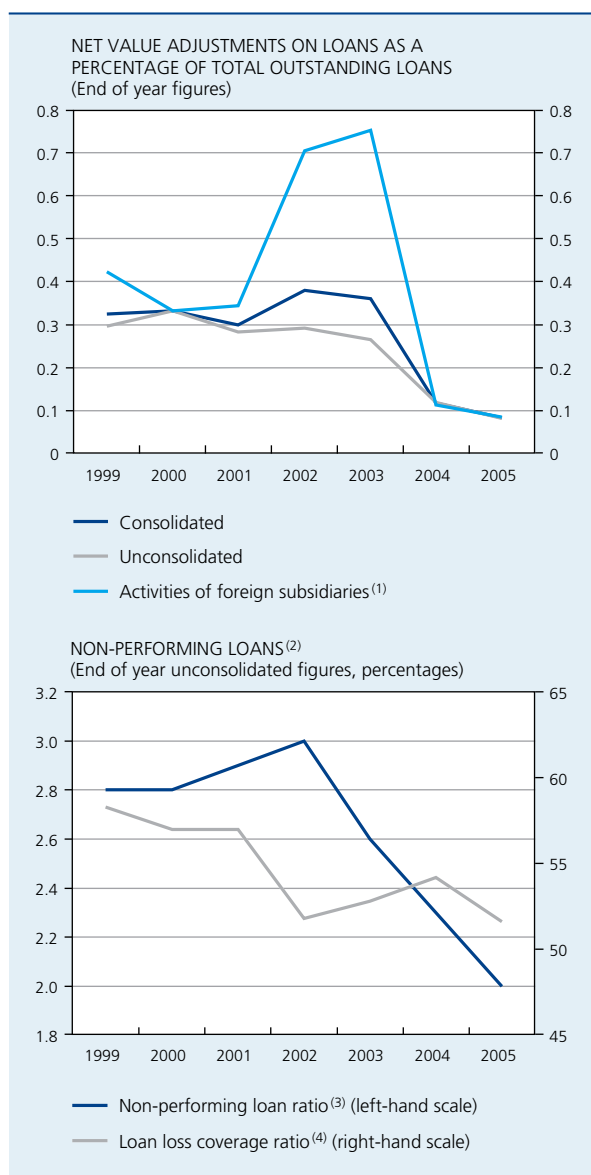
Separate data for Belgian banks' value adjustments on their foreign and domestic loan portfolio are not available. Nevertheless, one can compare the pattern of value adjustments on a consolidated and an unconsolidated basis. The difference between the two concepts is a good proxy for the value adjustments on loans extended by Belgian banks' foreign subsidiaries (Chart 32, upper panel). The movement in value adjustments on these loans illustrates that the international expansion has not

CHART 31 COMPOSITION OF BELGIAN BANKS' PROVISIONS
(Consolidated figures, percentages of total assets)



Sources: CBFA, NBB.

CHART 32 NON-PERFORMING LOANS AND VALUE ADJUSTMENTS ON BELGIAN BANKS' CREDIT PORTFOLIO



Sources: CBFA, NBB.

(1) Value adjustments on the activities of foreign subsidiaries have been estimated as the difference between consolidated and unconsolidated figures.

(2) Only for credit institutions under Belgian law.

(3) The non-performing loan ratio is the stock of unrecoverable and doubtful loans and loan commitments as a percentage of total loans to customers and loan commitments.

(4) The loan loss coverage ratio is the stock of value adjustments on loans and provisions for loan commitments to the stock of unrecoverable and doubtful loans and loan commitments.

been without risks. Indeed, the charges booked on loans by foreign subsidiaries have been rather volatile in recent years. In particular, value adjustments on loans extended by foreign subsidiaries witnessed a sharp increase in 2002 and 2003.

Nevertheless, value adjustments on loans extended by foreign subsidiaries, as well as the total consolidated value adjustments of Belgian banks, have been very low since 2004 and at the end of 2005, they amounted to less than 0.1 p.c. of total outstanding loans. Indeed, according to their published financial statements, provisions for bad loans at the major Belgian banks are at historically low levels. KBC for example records that provisions for loan losses as a percentage of total loans amounted to only 0.01 p.c. in 2005, a decrease of 0.70 percentage points from the level in 2003. This fall has been most spectacular on its loan portfolio in Poland, where the ratio declined from 8.68 p.c. in 2003 to -0.25 p.c. in 2005 as a result of a net withdrawal of value adjustments.

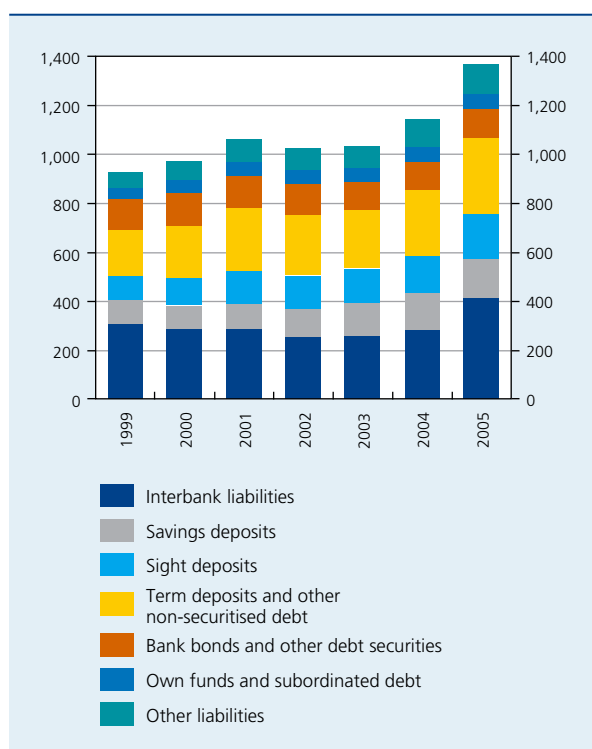
Apart from data on the flow of banks' value adjustments, data on the stock of value adjustments and on the coverage ratio of non-performing loans are also available, be it only on an unconsolidated basis. As Chart 32 (lower panel) indicates, the non-performing loan ratio – defined as the ratio of non-performing loans to total loans – has declined, in line with the decrease in value adjustments recorded on the unconsolidated loan portfolio of Belgian banks, reaching 2 p.c. at the end of 2005. At the same time, the loan loss coverage ratio went down, but nevertheless still amounted to 51.6 p.c. at the end of 2005.

3.3 Interest rate risk

While the analysis of credit risks focuses on the assets' side of banks' balance sheets, the structure of the liabilities has to be considered too in order to assess the interest rate risk. More precisely, it is the interaction between the two sides which will determine what happens in this category of risks, which are controlled by banks through their ALM (Asset and Liability Management) procedures.

Like the development on banks' assets' side, the recent growth of Belgian banks' liabilities can mainly be attributed to the increase in interbank transactions. The rise in interbank liabilities accounted for almost half of the increase in the balance sheet total between 2003 and 2005. As a result, the share of interbank activities in Belgian banks' funding went up from 25 p.c. to 30.2 p.c. (Chart 33). Although customer deposits accounted for about a quarter of the total growth of banks' liabilities, their share in Belgian banks' funding went down from 40.4 p.c. to 36.7 p.c. between 2003 and 2005, as a result of the sharp increase in interbank activities. They remain the most important funding source for Belgian banks however, amounting to 503 billions of euro at the end of 2005.

CHART 33 BREAKDOWN OF BELGIAN BANKS' LIABILITIES
(End of year consolidated figures, billions of euro)



Sources: CBFA, NBB.

While savings deposits at Belgian banks had been growing at a yearly average rate of 12.6 p.c. between 2001 and 2004, the volume of these deposits only increased by 5 p.c. in 2005, levelling off at 159 billions of euro. The strong increase in the customer deposit base during 2005 was therefore mainly the result of a further rise in sight deposits, which expanded to 184 billions of euro at the end of 2005. Term deposits, which had gone down sharply in 2002 and 2003, started increasing again in 2004 to amount to 145 billions of euro at the end of 2005.

Chart 34 illustrates the maturity transformation function of credit institutions, which borrow at short-term maturities – reflected by their net short position in liabilities up to one month or with an indeterminate maturity – while lending at long-term maturities – illustrated by banks' net long position for longer maturities. As mentioned above, sight and savings deposits constitute the bulk of Belgian banks' positions at the short end of the maturity spectrum. The risks associated with this strong dependency on liabilities with mostly indeterminate maturities were however mitigated by another development on the assets' side. It is mostly the proportion of net long positions with

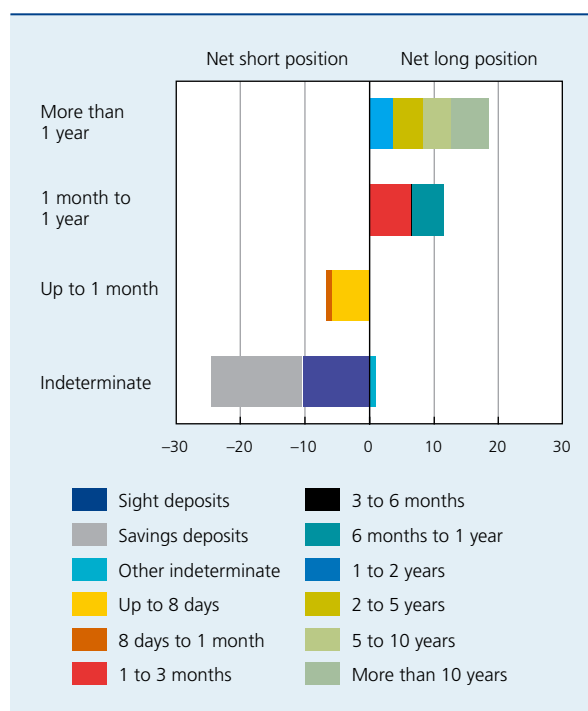
a remaining term to the next interest review date between one month and one year which has structurally tended to increase, while the net positions with longer maturities have levelled down (Chart 35).

The large-scale use of savings deposits to finance long-term assets is encouraged by the favourable tax treatment granted to this category of deposits. Up to a certain ceiling, they are exempt from the fully discharging withholding tax levied in Belgium on all interest and dividend income provided that they fulfil certain conditions. These include a two-tiered remuneration structure that must consist exclusively of a base deposit rate and either a growth premium or a loyalty premium, with statutory maximum limits applying to each of these rates.⁽¹⁾ This system encourages the long-term holding of savings deposits, which nevertheless maintain a high degree of liquidity, as they can usually be withdrawn at very short notice.

(1) For more details on the key features of Belgian regulated savings deposits, see Financial Stability Review 2005, Box 3, p. 39-41.

CHART 34 MATURITY TRANSFORMATION ACTIVITIES OF BELGIAN CREDIT INSTITUTIONS⁽¹⁾

(End of 2005 unconsolidated figures, percentages of total assets)



Sources: CBFA, NBB.

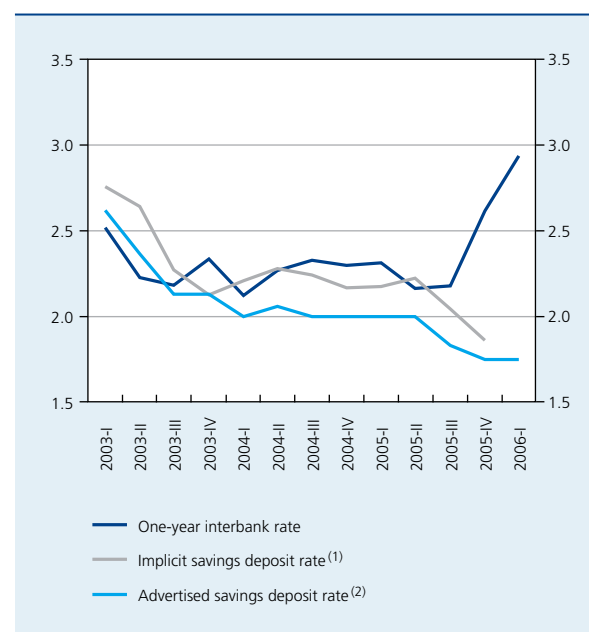
(1) Data are classified according to the residual term to the next interest rate review date. They include on- and off-balance-sheet positions.

The pricing constraints faced by Belgian banks in the collection of their savings deposits operate at two levels.

First, credit institutions are competing between themselves on the market for savings deposits. Newcomers and small credit institutions regularly run aggressive promotion campaigns, in an attempt to make inroads into the position of the largest market participants. For the latter, it is more difficult to increase advertised rates, as they have to extend these more favourable conditions to a much larger existing client base. In Chart 36, this is illustrated by the difference between the implicit savings deposit rate – which was calculated for all Belgian banks – and the advertised rate – calculated as the average advertised rate of the four major Belgian banks.

Second, savings deposits are competing with other investment products which may become more attractive in a low interest rate environment. In reaction, banks offer rates very close to wholesale market indicators. Up to the third quarter of 2005, the spread between the one-year interbank rate and the savings deposit rate was in fact very narrow, or even negative at times. More recently however, the spread between those two rates has been

CHART 36 DEVELOPMENT OF THE SAVINGS DEPOSIT RATE RELATIVE TO THE MARKET INTEREST RATE
(Percentages)



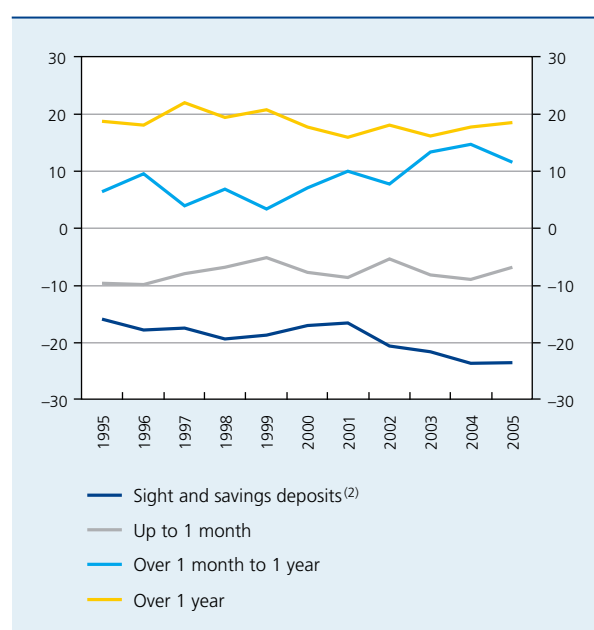
Sources: Thomson Financial Datastream, CBFA, NBB.

(1) The implicit savings deposit rate is based on unconsolidated figures for all Belgian banks and is calculated as the ratio of banks' charges on their savings deposits to their outstanding stock of savings deposits.

(2) The advertised savings deposit rate is estimated as the average of the sum of the base rate and the loyalty premium of the four major Belgian banks.

CHART 35 MAIN DEVELOPMENTS IN THE MATURITY TRANSFORMATION ACTIVITIES OF BELGIAN CREDIT INSTITUTIONS⁽¹⁾

(End of year unconsolidated figures, percentages of total assets)



Sources: CBFA, NBB.

(1) Data are classified according to the residual term to the next interest rate review date. They include on- and off-balance-sheet positions.

(2) Including also the small proportion of other positions with an indeterminate maturity.

widening again as the recent increase in interest rates has not yet been reflected in the savings deposit rates. This is temporarily easing the financing conditions of major Belgian banks, at the risk of increasing withdrawals or renewed competition for those deposits, in the event of a prolonged delay in adjusting the rates. The challenges faced by Belgian banks in adjusting to a decline in interest rates is illustrated in Box 4, which comments on the recent movements in the interest margin of Belgian banks.

3.4 Liquidity risk

To the extent that it is closely linked to banks' transformation of short-term liabilities in long-term assets, liquidity risk is to some extent connected with interest rate risk. A similar kind of quantitative indicators, *i.e.* the maturity mismatches, are often used to gauge both kinds of risks. For interest rate risks, maturities have to be measured according to the residual term to the next interest rate review date, but in the case of liquidity risk, maturities refer to the repayment date.

Box 4 – Recent developments in the interest margin of Belgian banks

During the last two years, Belgian banks have had to cope with a significant reduction in their interest margin in the general context of an overall decrease in the level of interest rates. It is difficult to identify the main determinants of this reduction, particularly as interest margins are influenced by a combination of several factors. In principle, banks' net interest income is generated by three different activities:

- loan origination, which is remunerated by the differential between rates charged to borrowers and risk free market rates. This spread covers the credit risks and the liquidity risks assumed by banks on their loans;
- collection of funds, which allows banks to get funding at a lower cost than market conditions. The differential remunerates the collection costs and the liquidity services provided by banks to their depositors;
- maturity transformation, through which banks benefit from the usually upward sloping yield curve by borrowing at an average shorter maturity than the average duration of their assets.

It is not possible to calculate those three different components. Besides the lack of detailed data on the commercial margins applied by banks in their loan origination and funding activities, the breakdown described above can only be realised for new operations. However, banks' balance sheets comprise a combination of transactions settled at very different periods. Thus, assets or liabilities with a one year remaining period to the next interest rate review may correspond to 12 month lending or borrowing operations concluded today or, alternatively, to transactions concluded several years earlier which still have a residual term of one year to the next interest rate review date. Moreover, the classification in maturity brackets says nothing about the maturity of the rate to be revised, so that a 15 year straight loan in its 14th year or a 15 year loan with 5-yearly rate reviews in its 4th year will find themselves in the same 1 year maturity bracket. The rates on those different assets and liabilities will obviously be quite different, and it is precisely those "repricing effects" that are the main component of interest rate risk borne by banks.

From here on, the attempt to detect the main drivers of the movement in the interest margin of banks adopts a somewhat different approach. For each year of the period 1999 to 2005, the effective average yield on banks' assets and average costs of their liabilities have been, respectively, compared to the rate that banks could have received or would have had to pay, at the current market conditions, to obtain a basket of assets or liabilities with a similar combination of maturities as that on the banks' own books (according to the remaining period to the next interest rate review).

For reasons of consistency and availability of data, the calculation has been limited to positions in euro on an unconsolidated basis and has excluded subordinated debt. Even so, the approach remains approximate as it had to be based on rather broad categories of maturities (10 bands ranging from up to 8 days to more than 10 years and for indeterminate maturities). For the latter, an assumption had to be made. More specifically, savings deposits were assumed to have a maturity of 2 years.

The numerous assumptions which had to be introduced do not influence the global size of the interest margin but affect the respective sizes of the various components of this margin, as they are calculated in the Chart. Those three components are the following:

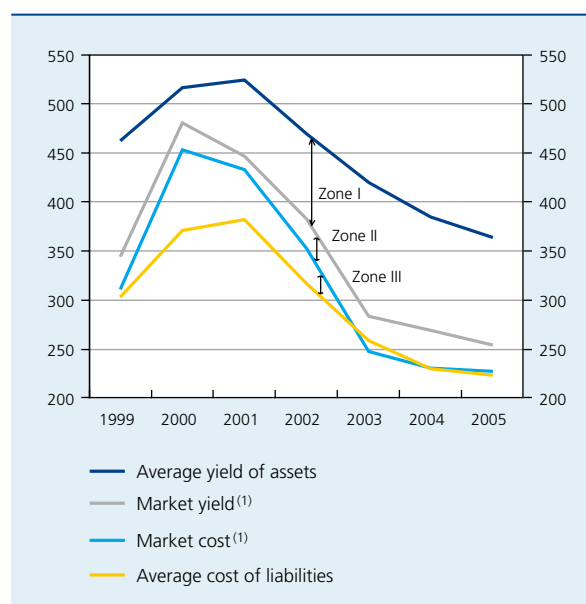
- difference between the average yield on assets and the market yield, at current market conditions (zone I of the Chart);
- difference between the market yield on assets and the market cost of liabilities (zone II);
- difference between the market cost of liabilities at current market conditions and the average cost of liabilities (zone III).

Of the three zones, zone II has been the most stable. As the yield curve has been constantly upward sloping during the period examined, banks were able to earn a positive remuneration from their pure maturity transformation activity. The two other zones have moved in opposite directions, producing a kind of "scissors effect".



COMPONENTS OF BELGIAN BANKS' INTEREST MARGIN

(Basis points)



Sources: Thomson Financial Datastream, CBFA, NBB.

(1) Corresponds, for each year, to the rate that banks could have received or would have had to pay, at that year's market conditions, to obtain a basket of assets or liabilities with the same combination of maturities as that on their books.

Zone I, *i.e.* the differential between the average yield and the market yield on assets, reflects a combination of loan origination spreads and repricing effects, the latter reflecting the changes in the market value of banks' assets from upward or downward moves in interest rates. This differential has constantly widened, except in 1999, which was the only year of the period when the average level of interest rates increased. The successive widening and narrowing are partly the result of the long average maturity of Belgian banks' assets. Thus, when interest rates fall, banks benefit fully from their large portfolio of long-term assets acquired at previous, higher interest rate levels. Conversely, when rates rise, as they did in 1999, Belgian banks are only able to pass on the higher rates as and when their assets are renewed.

The opposite effect applies to the differential between the average cost and the market cost of liabilities which, so to speak, combine funding spreads and repricing effects. This differential has decreased to practically zero in the last three years. To the extent that banks have long-term sources of funding (such as bank bonds), they still have to support the higher interest rates which were prevailing in the past. This factor is proportionally less important than on the assets' side as Belgian banks' liabilities are mostly short-term. However, in the current low interest rate environment, the collection of this short-term funding has also been more challenging for banks. In the case of sight deposits in particular, low market rates squeeze the so-called "endowment effect" that banks get when they use the money from sight deposits, which earn little or no interest, to invest in remunerated assets. While those constraints would be relaxed by an upturn in interest rates, such a rise would, at the same time, reduce the implicit capital gains on banks' assets or, yet, in the Chart, lower the present large differential between the market yield and the average yield on the assets' side. This illustrates the crucial importance, for banks, of the timing of the adjustment to new market conditions of the debit and credit interest rates applied to retail operations.

However, liquidity is a more elusive concept as it cannot be reduced to the sole dimension of maturities. Some short-term liabilities, such as sight or savings deposits, are relatively stable so that banks can use them, as shown in the previous section, to finance longer-term assets. Conversely, some short-term facilities granted by banks, such as overdrafts, are often difficult to terminate at short notice. In the same vein, it may be quite easy to mobilise long-term securities to obtain additional liquidity. Some off-balance-sheet items, such as confirmed credit lines provided by banks to their customers, also have the potential to strongly affect banks' liquidity, although they cannot be allocated to a specific maturity.

To provide a general view of the framework in which Belgian banks manage their liquidity, Table 7 structures banks' assets and liabilities into a few key components. Some significant developments took place in 2005. Loans to customers went up from 483 to 591 billions of euro. This increase of 22.4 p.c. far outpaced the growth of deposits which grew by only 11.1 p.c., from 615 to 683 billions of euro. To finance those net additional assets, banks increased their recourse to the interbank market where their net borrowing position almost doubled, going up from 69 to 131 billions of euro. At the same time, banks maintained – as a potential source of liquidity – a large portfolio of securities, most of which could be easily realised. At the end of 2005, those securities represented 26.9 p.c. of total assets, *i.e.* a percentage comparable to that recorded at the end of 2004. Liquidity analysis should also take banks' committed credit lines into account, as these may suddenly be drawn upon in times of a liquidity

crisis. At the end of 2005, the net amount granted by Belgian banks through committed credit lines stood at the quite substantial amount of 373 billions of euro.

It should be noted that the categorisation of assets and liabilities presented in Table 7 is blurred by ongoing developments on financial markets. Through securitisation, banks can convert an increasing portion of their illiquid assets into instruments that can easily be traded. On the other hand, a growing part of the securities portfolio is pledged to secure borrowing on the interbank market, and is therefore no longer available to obtain additional liquidity. Similarly, the development of real-time gross settlement (RTGS) and large value multicurrency systems (*e.g.* CLS) has also significantly increased the use of collateralisation.

Another key development is that large banking groups nowadays have to manage their liquidity in a cross-border perspective. In particular, they have to decide to what extent the different entities of the group are expected to rely on their own sources of funding or, conversely, may call on a centrally managed pool of liquidity. An important dimension, in that respect, is the nature and the location of collateral. Table 8 illustrates two developments. First, the proportion of Belgian securities in the total banks' portfolio went down from 46 p.c. in 1999 to 19.7 p.c. in 2005. During the same period, the portion of this portfolio located in Belgian branches and subsidiaries decreased from 71.7 p.c. to 63.7 p.c., in favour of foreign branches and subsidiaries. In a stress situation, it will be crucial for a banking group to determine on what conditions, and how

TABLE 7 LIQUIDITY STRUCTURE OF BELGIAN BANKS' ASSETS AND LIABILITIES

(End of year consolidated figures, billions of euro)

On-balance-sheet	2004			2005		
	Assets	Liabilities	Net position	Assets	Liabilities	Net position
Interbank positions	212.6	281.6	-69.0	282.2	413.4	-131.3
Customer loans and deposits ⁽¹⁾	482.9	614.7	-131.8	591.3	683.2	-91.9
Securities and debt instruments	323.1	73.6	249.5	368.0	87.7	280.4
Other assets and liabilities	124.6	173.3	-48.7	127.8	185.0	-57.2
Total	1,143.2	1,143.2	0.0	1,369.3	1,369.3	0.0
Off-balance-sheet	2004			2005		
	Granted	Received	Net position	Granted	Received	Net position
Available margin on committed credit lines	295.9	6.6	289.3	380.3	7.0	373.2

Sources: CBFA, NBB.

(1) Customer deposits comprise deposits, other non-securitised debt and bank bonds.

TABLE 8 LOCALISATION OF BELGIAN BANKS' SECURITIES PORTFOLIO

(End of year figures, percentages of the total securities portfolio, unless otherwise stated)

	1999	2001	2003	2005
Belgian branches and subsidiaries	71.7	71.9	70.5	63.7
Foreign branches	6.6	5.2	9.0	10.1
Foreign subsidiaries	21.7	22.8	20.5	26.2
Total	100.0	100.0	100.0	100.0
of which Belgian securities	46.0	31.8	27.6	19.7
of which foreign securities	54.0	68.2	72.4	80.3
<i>p.m. Total in billions of euro</i>	<i>294.9</i>	<i>316.9</i>	<i>301.5</i>	<i>368.0</i>

Sources: CBFA, NBB.

quickly, those securities could be transferred between the different entities to serve as a potential source of collateral.

In fact, the degree of centralisation of liquidity management in stress situations varies greatly from one banking group to another. It can be broadly classified into three categories. In a totally decentralised structure, the prevailing expectation would be that individual business units stand alone, and independently access funding liquidity, even in a stress situation. In an intermediate situation, business units would maintain general autonomy and handle the first stages of a crisis independently, but with increasing central assistance in the form of funding or liquidity management, should the crisis worsen. In a totally centralised system, business units would have access to a central function acting as the main provider of funding liquidity across the group. The degree of centralisation of liquidity management in banking groups in stress situations typically mimics the centralisation of liquidity management in banks' day-to-day business environment.

The CBFA is revising its current prudential approach to liquidity risk for credit institutions, which currently consists of regular off-site monitoring of the liquidity position of individual banks on the basis of banks' prudential reporting schemes, coupled to screening of banks' liquidity risk management in respect of the "Basel Sound Practices on Liquidity Risk Management".

The new proposal includes a revised liquidity reporting framework and more explicit qualitative guidelines with regard to liquidity risk management, but – in the absence of international harmonised quantitative standards – refrains from introducing an explicit, quantitative

liquidity regulation. This reoriented prudential approach, which is intended to fit in with the CBFA's plan for the implementation of the second pillar of Basel II, has been submitted to the banking sector for consultation, the date for implementation being 1 January 2007.

The revised liquidity reporting scheme should resolve the deficiencies of the current scheme by extending the reporting base from an unconsolidated basis to a consolidated basis. It will also provide more detailed information on the extent to which banks' portfolios of liquid assets are involved in transfer agreements as collateral, and on the cash flows related to derivative transactions. Furthermore, on a consolidated basis, banks would have the option of reporting their internal liquidity ratios – after the approval by the CBFA – instead of adopting the standard reporting scheme.

A key component in the management of liquidity risk is the implementation of good stress testing procedures. Such procedures are increasingly used not only by banks but also by prudential authorities to gauge the resilience of the financial system to sharp changes in the market environment, as well as the readiness of individual institutions to react quickly to adverse conditions. Box 5 presents a typology of those stress tests together with a short presentation of the main steps taken at national and international level to develop a coherent and harmonised approach in the conduct of such tests.

Box 5 – The use of stress tests in the prevention and resolution of financial crises

1. Introduction

Both individual financial institutions and authorities increasingly use stress tests in order to assess the impact of plausible but extreme events (*i.e.* tail events). While the former use them as a part of their internal risk management framework and to fulfil new regulatory requirements, authorities use stress tests as a tool to assess the stability of individual institutions (microprudential level) or of the system as a whole (macroprudential level). Stress testing thus promotes financial stability, as it contributes to the prevention as well as the management and resolution of crises.

By quantifying potential losses following an extreme but plausible shock, stress tests can serve as a tool to monitor the system's resilience to shocks, to identify structural vulnerabilities and to measure overall risk exposure. In addition, stress tests can also be useful if a crisis occurs. In such a case, the negative effects for financial stability can be reduced through effective and efficient crisis management procedures and well-structured decision making frameworks and arrangements for the resolution of the crisis. Testing these arrangements under simulated critical circumstances might be useful in setting up or evaluating such procedures and arrangements.

These two applications of stress tests differ with respect to the required inputs, the methodology used, the type and interpretation of outputs and the scenarios used. Note that this box only deals with financial crises. Operational crises are the subject of specific arrangements, which are discussed in more detail in the article of this FSR on "The Belgian Financial Stability Committee initiatives on business continuity planning".

2. Stress testing the financial soundness of financial institutions

There are a number of important choices to be made in the design of financial stress tests, such as the types of risk to include, whether single or multiple risk factors should be shocked, the modelling of the scenario-generating process, the selection of the parameters to shock, the magnitude of the shock and its time horizon.

The range of risks that could be included in stress tests is large and includes interest rate risk, credit risk, liquidity risk, equity risk, exchange rate risk, operational risk and legal risk. However, data limitations and difficulties in the quantification and modelling explain why financial stress tests for certain types of risks, such as operational risk, are less developed than for others. Ideally, stress tests should be most effective in capturing the risk areas to which the institutions have the largest exposures.

Stress tests can take the form of either sensitivity tests (single factor) or scenario analyses (multiple factors). While sensitivity tests are the easiest to set up, they have significant shortcomings. First, they typically assume the shock to take place immediately, without incorporating a gradual process of mounting pressure. Second, sensitivity tests only stress one risk factor, leaving the other factors unchanged. In such a *ceteris paribus* method, the interactions between different types of risk are not taken into account. Third, sensitivity tests do not include second round effects, *i.e.* institutions' reactions to the initial shock and the impact of these reactions on the economy, and hence again on the institutions.

Scenario tests aim to assess the impact of a shock over a certain time span and allow various risk factors to be stressed simultaneously. In order to ensure that they are plausible and internally consistent, the scenarios should be backed by a macroeconomic framework. This could be obtained by using a structural macroeconomic model, of the kind used by central banks in the monetary policy decision making process, or a vector autoregressive (VAR) model, which could be better adapted to the estimation of the impact of shocks. Such models use a number of macroeconomic and financial variables – which have to be chosen on the basis of their relevance for the exercise



and on data availability –, such as GDP growth, inflation, short- and long-term interest rates, employment, foreign exchange rates and equity prices, and provide as an output the baseline and stress economic scenarios to which the institutions will be exposed.

The stress scenarios can be calibrated on the basis of historical observations (e.g. the worst situation observed in the last 20 years) or may be hypothetical (e.g. three standard deviations from the baseline scenario). While historical scenarios may be less flexible, may not fully reflect exceptional but plausible events and may fail to capture changes in the nature of financial markets and new products being developed, they may provide useful information as to the way risk factors behave jointly in a crisis. In any case, the stress scenarios should be carefully constructed in order to obtain a “plausible but extreme shock”.

The macroeconomic scenarios then have to be translated into useful risk factors, such as the probability of default or the loss given default on a credit portfolio, which can be used to obtain the impact on banks’ balance sheets and profitability. This can be done, for instance, by estimating the historical relationship between the macroeconomic variables and the risk factors.

Although great progress has been made in recent years, scenario tests still suffer from a number of weaknesses, which could explain why, up to now, most of these tests generally conclude that extreme shocks have a rather limited impact on the financial position of banks. On the one hand, periods of stress have in the past proved to be the result of pressures that persist for a number of years and progressively weaken the financial position of banks, so that it would be desirable to lengthen the horizon of stress tests. On the other hand, if longer time horizons are used, the assumption that institutions do not make changes to their portfolios and hence their risk exposure, in reaction to the shocks experienced, cannot be maintained. The modelling of second-round effects, capturing banks’ reactions to shocks and the impact of these reactions on the economy, remains challenging.

In order to further improve the quality of such tests, both the Task Force on Stress Testing set up by the ESCB Banking Supervision Committee (BSC), and the Research Task Force of the Basel Committee on Banking Supervision (BCBS) are involved in projects taking stock of current practices and providing guidance on best practices and improvements in the methodology. The Committee on the Global Financial System of the G10-countries has also investigated stress testing practices in large, complex financial institutions.

Notwithstanding the remaining difficulties, stress tests are an important part of the Financial Sector Assessment Program (FSAP) of the IMF, as a tool to analyse the financial position of the financial sector. Thus, various stress tests were performed on the Belgian financial system during the IMF FSAP for Belgium. Two main types of stress tests were performed. In the “top-down” tests, the authorities themselves estimated the impact of various shocks on the profitability and solvency of the entire financial system, on the basis of their own model and of aggregated prudential data. In the “bottom-up” tests, the authorities only defined the nature of the shocks and left the main systemic individual institutions to assess the impact through their internal models. In future, this second kind of tests will be organised on a regular basis by the CBFA and the NBB.

From a microprudential or supervisory perspective, the Basel II Framework, and hence the European Capital Requirements Directive, introduced additional stress testing requirements. In the first pillar, these tests are part of the capital adequacy assessment under the more advanced methods, providing an additional tool for supervisors to assess the quality of the parameters used by the banks in their internal models. In the second pillar, stress tests will be required as part of banks’ internal capital adequacy assessment procedure. The stress tests will also be examined as part of the supervisory review process. In this connection, the Committee of European Banking Supervisors (CEBS) is planning to consult the banking sector on a set of guidelines elaborating the stress testing requirements included in the Capital Adequacy Directive. They aim at providing technical guidance and clarification to supervisors, for the supervisory review process, and to banks.



3. Testing of crisis management and resolution arrangements

Another field in which stress tests can be useful is the validation and assessment of crisis management procedures and resolution arrangements. These arrangements are defined as the set of actions that can be taken by authorities aimed at containing and resolving a financial crisis, avoiding potentially disruptive effects on the financial system or the real economy. They include internal measures (e.g. contingency planning), arrangements between different authorities at the domestic level, and cross-border arrangements between relevant authorities that could be specified in Memoranda of Understanding (MoU).

Stress tests can be used to assess authorities' capacity to deal with crises under the existing arrangements as part of a regular evaluation and, if necessary, in order to improve their capacity to manage crises. In particular, crisis simulations can be used to increase preparedness and identify possible sources of failures among the authorities responsible for crisis management. These failures can relate both to the operational level, such as the availability of persons and communication channels, and the level of decision making, including the need for coordination, exchange of information and definition of responsibilities. Simulation exercises may thus focus on more operational issues as well as on decision making processes.

In Belgium, simulation exercises performed up to now have tested the efficient functioning of communication channels and the availability of staff, in the case of a crisis in one or more financial institutions or infrastructures which are critical for the stability of the domestic financial system, or in the relevant public authorities.

At the international level, the management and resolution of cross-border crises with potentially systemic repercussions is particularly challenging. This is especially true in the EU, where the increasing integration of financial markets and infrastructures and the emergence of banking groups with significant activities in several member states has increased the scope for cross-border contagion and the likelihood of a systemic crisis affecting more than one country. This challenge gave rise to two multilateral MoUs, in 2003 and in 2005, on coordination and cooperation between banking supervisors, central banks and finance ministries in a financial crisis situation.

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4. Insurance companies and pension funds

4.1 Links between the banking and the insurance sector

The relative importance of the insurance sector in the Belgian financial system has gradually increased in recent years. Insurance companies are collecting a larger percentage of households' savings and, as a consequence, have recorded a more substantial increase in the size of their securities portfolio than banks, pointing to their growing role on financial markets. Between 1995 and 2005, the share of households' savings channelled through Belgian insurance companies increased from 8 p.c. to 19 p.c., while that of banks decreased from 41 p.c. to 32 p.c. (Chart 37). Over the same period of time, insurance companies' securities portfolio grew by 212 p.c., compared to 58 p.c. for banks.

The main Belgian groups have benefited from this growing market share of insurance products through the formation of *bancassurance* conglomerates. The six largest banking and insurance groups hold a market share of 85.2 p.c. in banking and 73.8 p.c. in insurance (Table 9). The first four groups, which are much larger than the other two, are mainly active in banking, a partial indicator being the relative weight of this activity in their total

profit, which ranges from 66.5 p.c. in the case of Fortis to 84.4 p.c. for ING Belgium.⁽¹⁾ The other two groups are mainly insurance groups which have developed some banking activities more recently. The same segmentation emerges from figures relating to those respective groups' total assets.

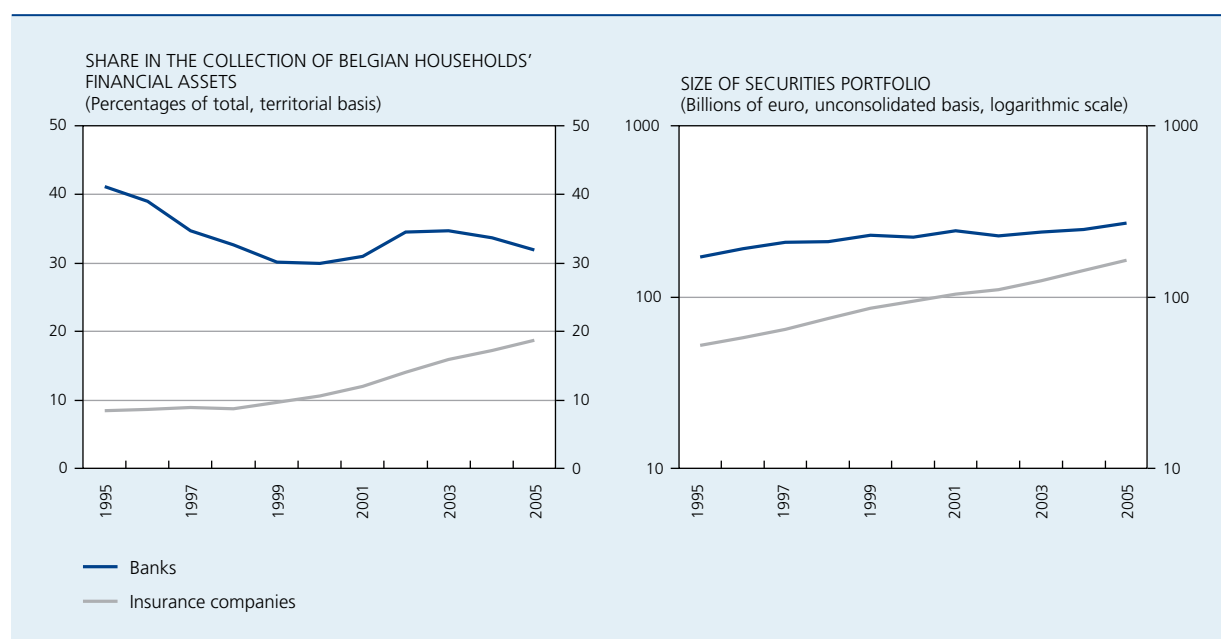
4.2 Solvency of the insurance sector

The rapid growth of their activities requires insurance companies to regularly increase their own funds, especially as the current requirements are still based purely on the volume of business (technical provisions in life insurance and claims or premiums in non-life insurance), and do not yet take into account the specific risk profile of the contracts concluded.

According to quarterly figures – which do not include the impact of the allocation of profits to shareholders and policyholders, nor the final figures for a series of balance sheet items, such as those concerning the investments and the technical reserves – the regulatory solvency margin has declined slightly from 281 p.c. of the required margin at the end of 2004 to 275 p.c. at the end of 2005

(1) The activities of the entire ING group are, however, much more balanced between banking and insurance, with 53 p.c. of net profit in 2005 stemming from the banking activities.

CHART 37 RELATIVE IMPORTANCE OF BELGIAN BANKS AND INSURANCE COMPANIES IN THE BELGIAN FINANCIAL SYSTEM



Sources: CBFA, NBB.

TABLE 9 MARKET SHARE AND RELATIVE IMPORTANCE OF BANKING AND INSURANCE ACTIVITIES
FOR THE LARGEST FINANCIAL GROUPS ON THE BELGIAN MARKET
(Percentages)

	Market share in Belgium ⁽¹⁾		Contribution to group profit ⁽²⁾⁽³⁾		Share of total assets ⁽³⁾	
	Banking ⁽⁴⁾	Insurance ⁽⁵⁾	Banking	Insurance	Banking	Insurance
Dexia	14.7	6.4	81.1	18.9	93.1	6.9
Fortis	31.9	17.8	66.5	33.5	85.7	14.3
ING Belgium	14.0	6.7	84.4	15.6	93.3	6.7
KBC	21.4	13.4	80.7	19.3	91.2	8.8
<i>Subtotal</i>	<i>82.0</i>	<i>44.3</i>	–	–	–	–
Axa	2.6	13.7	12.7	87.3	45.3	54.7
Ethias	0.6	15.8	⁽⁶⁾	⁽⁶⁾	6.6	93.4
Total	85.2	73.8	–	–	–	–

(1) On the basis of deposits by Belgian residents for banking and collected premiums for insurance.

(2) Percentages of the group's net operating profit.

(3) Data for 2005, except for Axa and Ethias (2004).

(4) Data for 2005.

(5) Data for 2004.

(6) As Ethias is a mutual insurance company, profits are generally distributed to policyholders, leaving only a small net profit for the company.

(Chart 38, left-hand panel). This decrease was concentrated in the fourth quarter of 2005, when a large inflow of new life insurance premiums, caused by Belgian households anticipating the introduction, on 1 January 2006, of a new tax of 1.1 p.c. on life insurance premiums, led to an increase in the required margin.

In 2005, the movement in the solvency position of the smaller companies was somewhat different from that seen in the largest companies (Chart 38, right-hand panel). On the one hand, small insurance companies accounting for 21 p.c. of the total number of companies but only for 6 p.c. of the sector's total assets, recorded increases in their regulatory solvency margin of more than 20 p.c. The regulatory solvency margin of the largest companies, on the other hand, remained more stable or even declined slightly. Thus, a reduction in the solvency margin of between 0 and 10 p.c. was recorded for companies accounting for 19 p.c. of the total number of companies but for 36 p.c. of the sector's total assets.

The regulatory solvency margin includes not only insurance companies' book equity and some other balance sheet items⁽¹⁾, but also a few elements that can be included only after authorisation by the supervisor. The most important ones are a part of the future expected profits of life insurance activities⁽²⁾ and part of the unrealised capital gains on the investment portfolio.

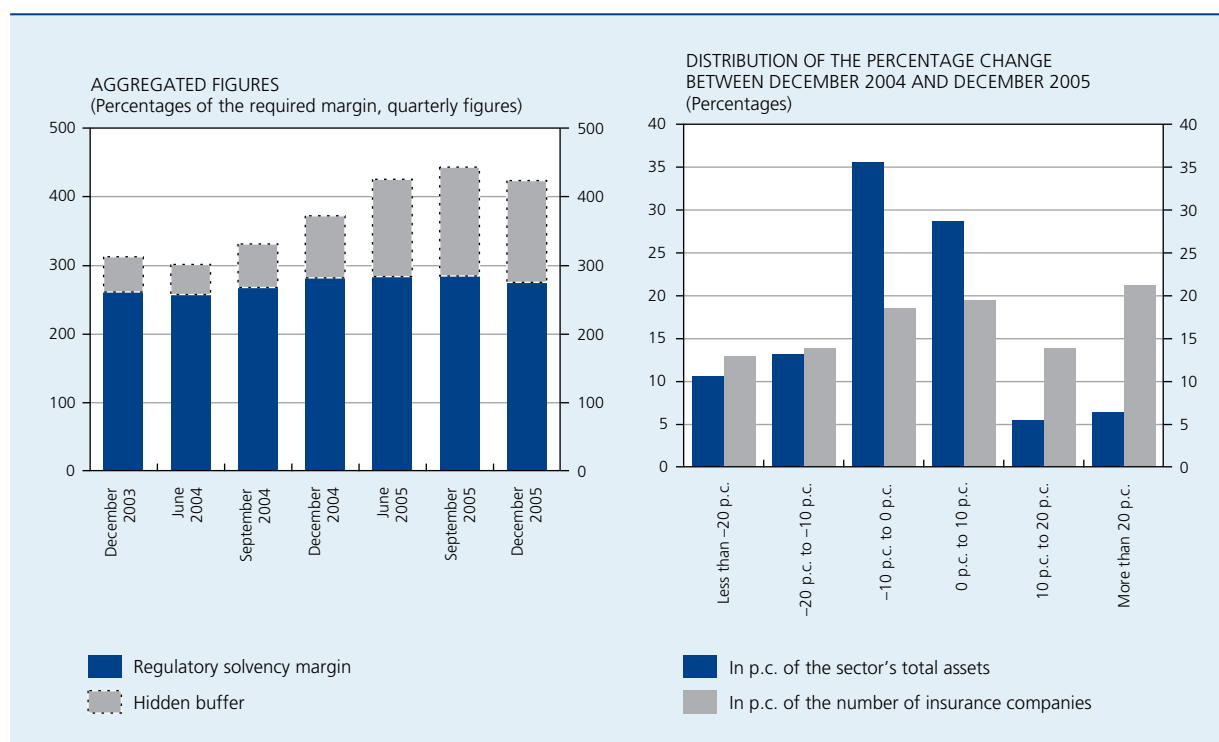
The existence of the latter component is linked to the accounting rules for the valuation of insurance companies' investments.⁽³⁾ According to these rules, most unrealised capital gains and losses are not included in the book value of insurance companies' investment portfolios, and therefore do not entail a change in their book equity. However, with the CBFA's authorisation, a small part of the latent capital gains may nevertheless be incorporated in the regulatory solvency margin.

The portion of these gains which is not included in the margin represents a kind of hidden buffer for insurance companies. This buffer has fluctuated considerably in recent years, mainly reflecting changes in bond and equity prices, and represented 149 p.c. of the required margin at the end of 2005. In the last quarter of that year, the buffer declined slightly as a result of the rise in interest rates, which reduced capital gains on the bond portfolio. This development continued in the initial months of 2006.

(1) These mainly include subordinated debts and, since 2004, the fund for future allocations. This fund comprises the positive result of the technical account in life insurance for which it has not yet been decided, at the balance sheet date, whether to distribute it to shareholders or policyholders.

(2) The scope for including these future profits in the regulatory solvency margin is gradually being reduced and will be abolished by 2010.

(3) These rules were described in detail in the Financial Stability Review of 2004, Box 5, p. 56-58.

CHART 38 AVAILABLE SOLVENCY MARGIN OF BELGIAN INSURANCE COMPANIES

Sources: CBFA, NBB.

New solvency rules are currently being prepared in the framework of the EU Solvency II Directive, which aims at bringing capital requirements more in line with the real risk profile of companies. These requirements will therefore take into account a larger number of risk factors in the calculation of the capital requirement. They will also make use of more sophisticated calculation methods and will authorise supervisors to adapt capital requirements on an individual basis to the profile of the company. This new regulation, together with the introduction of international accounting standards for insurance contracts, will also lead to a more market-consistent valuation of both assets and liabilities, which will eventually eliminate the existence of most latent capital gains. More details on the new framework can be found in an article in this FSR: "The new capital framework for European insurance companies".

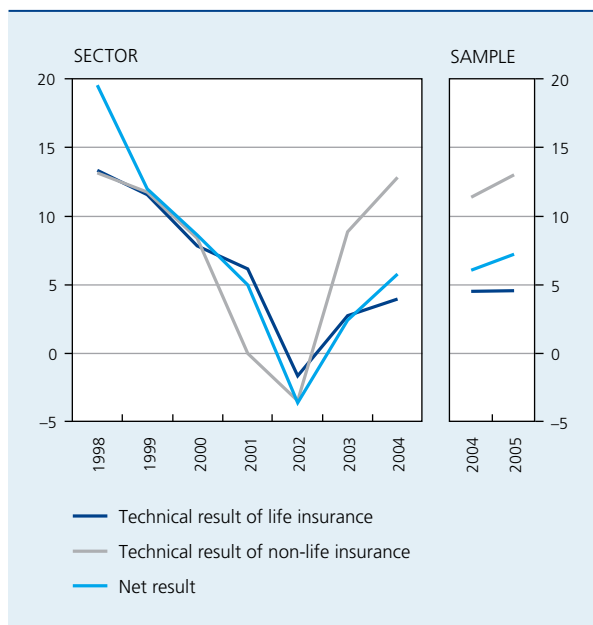
4.3 Profitability of the insurance sector

While not all companies' supervisory schemes are available as yet, the provisional data for a sample of 13 companies, which accounted for around 81 p.c. of total life and 56 p.c. of total non-life insurance premiums in 2004, can be used to analyse the sector's profitability in 2005.

Those figures point to a further improvement, as the net profit, in absolute terms, rose by 48.7 p.c. However, the rise in profitability varied between the two branches of activity. Profits increased substantially more in life insurance than in non-life insurance. This difference in profit growth was largely explained by a volume effect, the market growth, measured by the volume of collected premiums, being much stronger in life than in non-life insurance. The technical result expressed as a percentage of collected premiums in non-life insurance improved from 11.4 to 13.0 p.c. (Chart 39), regaining the level recorded in 1998, while in life insurance, the technical result remained quasi unchanged at 4.6 p.c. of collected life premiums.

To obtain the total net result, the non-technical result, which incorporates the financial results that have not been attributed to life or non-life activities, as well as exceptional items and taxes, has to be added to the technical results of life and non-life insurance. This item has improved from -0.2 to 0.9 p.c. of total premiums as a result of the further pick-up of unallocated financial revenues, thus becoming positive again after several years of losses.

CHART 39 RESULTS OF BELGIAN INSURANCE COMPANIES
(Percentages of collected premiums⁽¹⁾)



Sources: CBFA, NBB.

(1) Life insurance premiums for life insurance activities, non-life insurance premiums for non-life activities and all premiums for the net result.

Finally, the net result increased from 6.0 to 7.2 p.c. of total collected premiums. While this result is still lower than the high levels achieved at the end of the nineties, insurance companies have been able to gradually restore profitability after the losses incurred in 2002.

4.3.1 Non-life insurance and underwriting risk

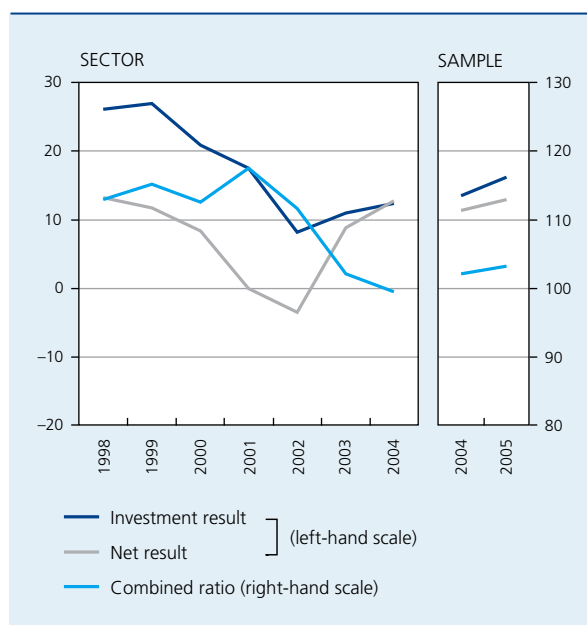
The strong improvement in the technical result in non-life insurance in 2005 was due entirely to the rise in investment income from 13.5 p.c. to 16.3 p.c. of collected premiums (Chart 40). In contrast to 2004, underwriting activity as such did not contribute to the rise in profitability. This is evident from the movement in the combined ratio, which expresses the insurance costs (amount of claims and changes in technical provisions) and operating costs as a percentage of collected premiums. For the sample of the 13 largest insurance companies, this ratio stabilised at around 103 p.c. in 2005, whereas, for the non-life sector as a whole, it had fallen in 2004, reaching a level below 100 p.c. for the first time in years.

Premiums in non-life insurance increased by only 4 p.c. in 2005, compared to 5.5 p.c. in 2004. This relatively low growth rate is indicative of the market's maturity, showing limited growth potential, but also points to the fact that

insurance companies did not significantly increase their prices in a context of relatively low claims in the past few years. There are, however, significant differences between product classes, and insurance companies have continued their efforts to clean up their least profitable portfolios through cost saving efforts and sound risk selection practices.

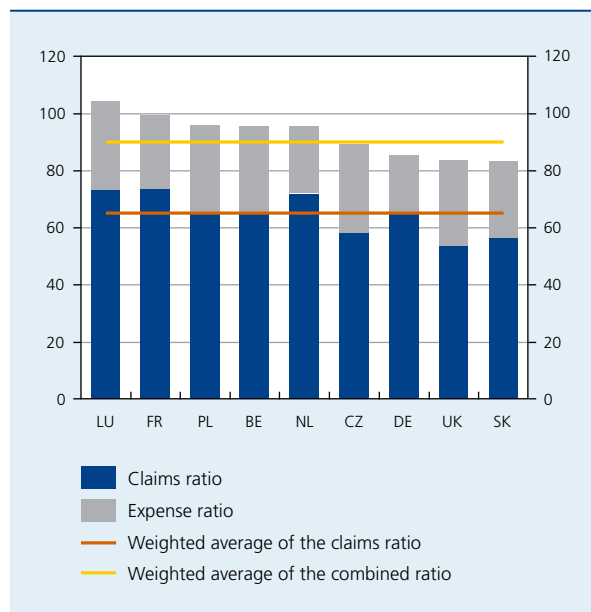
From an international perspective, the combined ratio of Belgian insurance companies is slightly higher than the weighted average of the corresponding levels in the neighbouring countries and a number of Central and Eastern European countries in which KBC has substantial insurance activities (Chart 41). The combined ratio can be broken down into an expense ratio, expressing insurance companies' operating costs as a percentage of collected premiums, and a claims ratio, *i.e.* the ratio between insurance costs and premiums. The higher combined ratio of Belgian insurance companies is due entirely to their higher expense ratio, while their claims ratio equals the weighted average of the set of countries, and is actually lower than in France, Luxembourg and the Netherlands. Note that, due to limitations in available data for a number of countries, the claims ratio used for this international comparison only includes the costs associated with claims and not those related to net changes in the technical provisions, leading to a slightly lower combined ratio than the one calculated above.

CHART 40 RESULTS OF BELGIAN INSURANCE COMPANIES' NON-LIFE ACTIVITIES
(Percentages of collected premiums)



Sources: CBFA, NBB.

CHART 41 INTERNATIONAL COMPARISON OF INSURANCE COMPANIES' COMBINED RATIO
(Percentages of collected premiums in 2004)



Source: CEIOPS.

Belgian insurance companies reinsure part of their risks and are thus exposed to the pricing conditions in this highly internationalised market. The reinsurance market is traditionally cyclical, whereby periods of heavy losses (such as 9/11) are followed by a decline in reinsurance capacity and increasing prices, while the absence of major disasters leads to an easing of market conditions. So, Belgian insurance companies recorded, between 2001 and 2003, a sharp deterioration in the contribution of reinsurance to their non-life underwriting result, from 2.2 to -7.0 p.c. of gross collected premiums (Chart 42).

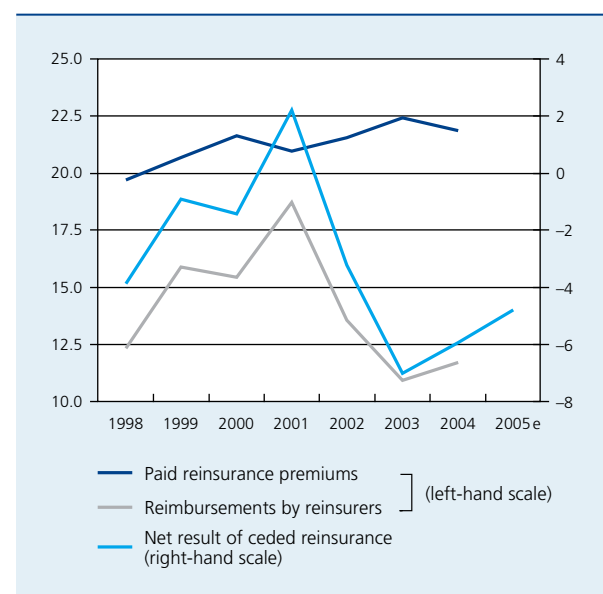
More recently, competition in the industry has been fuelled by the entry of new players and the improved capital position of reinsurers as a consequence of the rate increases, putting pressure on premium rates. In line with this development, the net result of Belgian insurance companies' ceded reinsurance has in the last two years improved slightly to about -4.8 p.c. of gross collected premiums, as paid reinsurance premiums decreased, while insurance costs paid out by reinsurance companies rose. Note, however, that several factors which are difficult to disentangle influence net reinsurance results. Reinsurance intervention is traditionally triggered in cases when insurance costs exceed a certain threshold. As such, the observed increase in the net result of ceded reinsurance might reflect the fact that insurance companies have recovered higher amounts on large claims.

The serious catastrophe losses related to the US hurricanes in 2005 could again force premium rates up in the coming years. While this development would be positive for the resilience of the reinsurance sector, it could have a negative effect on Belgian non-life insurance companies, which might be confronted with higher reinsurance costs or difficulties in obtaining reinsurance cover for certain risks.

Belgian non-life insurance companies are also exposed to reinsurance markets through reinsurance accepted. Although there is only one pure reinsurance company on the Belgian market, a larger number of Belgian insurers partly reinsure each other and reinsure certain risks of foreign companies. For the Belgian market as a whole, received reinsurance premiums accounted for 3.8 p.c. of total non-life premiums in 2004 (Chart 43). While this share has declined gradually over the last few years, the net result generated by reinsurance activities has been fluctuating between 10 and 20 p.c. of the total result in non-life insurance. Although reinsurance results are rather volatile, they have remained positive even in 2001 and 2002, when direct insurance activities have recorded losses.

Currently, the CBFA supervises the reinsurance activities of Belgian companies in the same way as their other activities. However, a new, harmonised supervisory framework

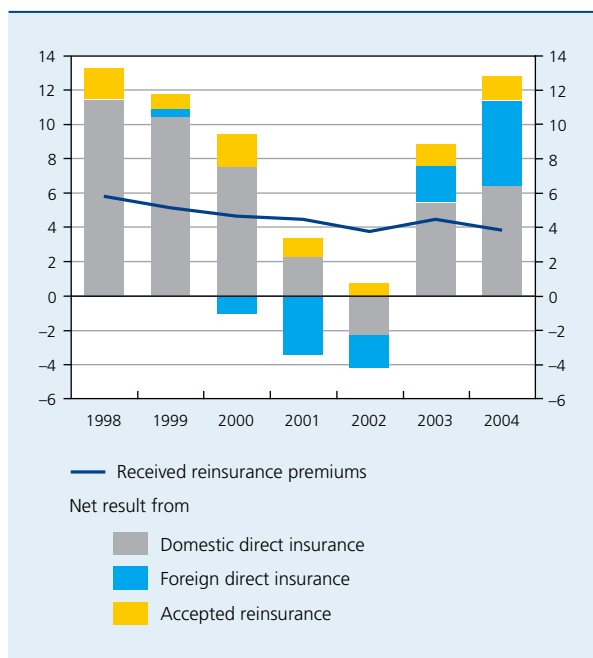
CHART 42 IMPACT OF CEDED REINSURANCE ON BELGIAN INSURANCE COMPANIES' NON-LIFE UNDERWRITING RESULT
(Percentages of gross non-life premiums)



Sources: CBFA, NBB.

CHART 43 IMPORTANCE OF ACCEPTED NON-LIFE REINSURANCE ACTIVITIES FOR BELGIAN INSURANCE COMPANIES

(Percentages of total non-life premiums)



Sources: CBFA, NBB.

for specialised reinsurance companies, developed at the European level⁽¹⁾, will be introduced in the coming years, pending a more thorough reform of the supervision of the whole insurance industry under Solvency II.

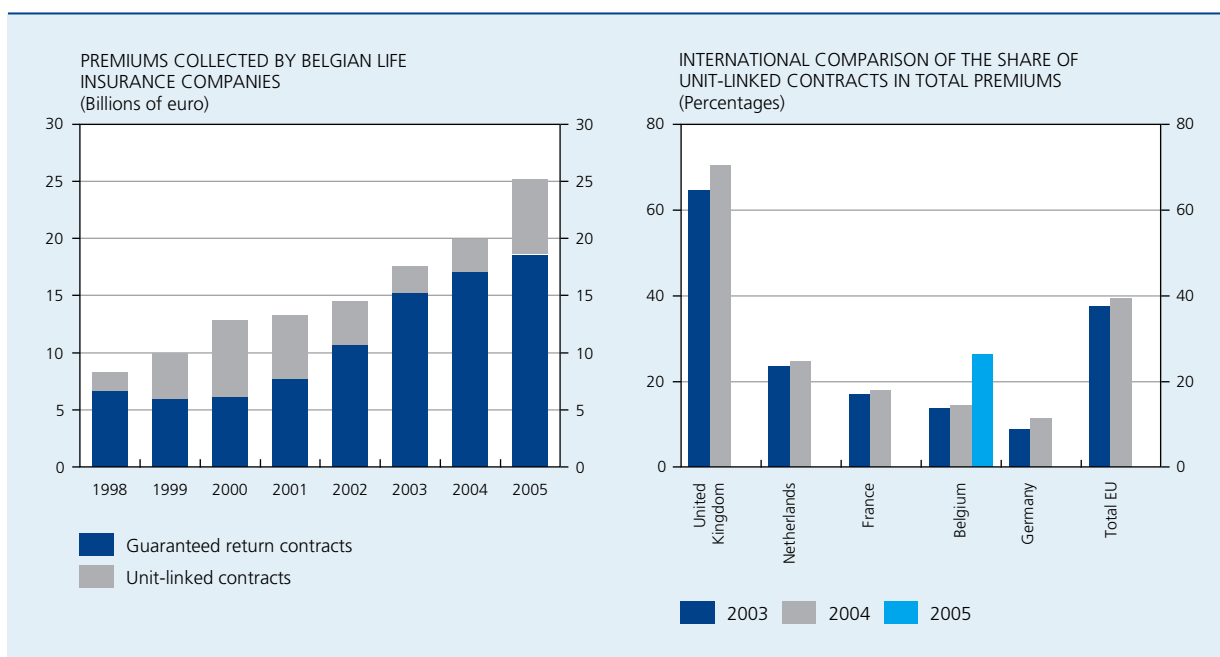
4.3.2 Life insurance and investment risk

As already mentioned, a strong increase in the volume of activities resulted in an improvement in the life insurance net result in absolute terms, while profitability expressed as a percentage of collected premiums stabilised. The 25.5 p.c. increase in the level of premiums recorded in 2005 is in keeping with the growing importance of long-term saving products in the building up of old-age provision. It is also the consequence of a one-off factor, *i.e.* the anticipation by households of the introduction of a new tax of 1.1 p.c. on insurance premiums in 2006.

Although the growth rate of unit-linked (class 23) insurance contracts (130 p.c.) far exceeded the growth rate of guaranteed return (class 21) contracts (8.9 p.c.) in 2005, the latter remain the main contributor to the trend growth in the life insurance business (Chart 44, left-hand panel). Whereas the annual premiums under these contracts amounted to about 6 billions of euro in 2000,

(1) Directive 2005/68/EC of the European Parliament and of the Council of 16 November 2005 on reinsurance and amending Council Directives 73/239/EEC, 92/49/EEC as well as Directives 98/78/EC and 2002/83/EC.

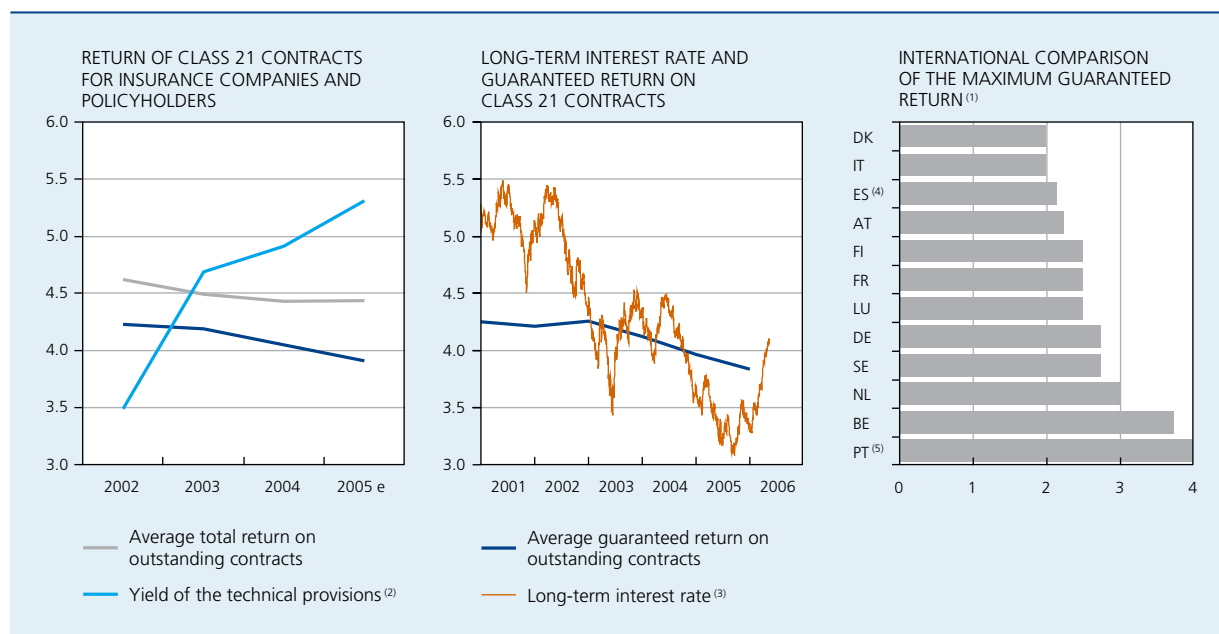
CHART 44 UNIT-LINKED VERSUS GUARANTEED RETURN LIFE INSURANCE PREMIUMS



Sources: Assuralia, CBFA, CEIOPS, NBB.

CHART 45 PROFITABILITY OF GUARANTEED RETURN LIFE INSURANCE CONTRACTS

(Percentages)



Sources: CBFA, CEIOPS, NBB.

(1) Information available up to year-end 2005.

(2) Investment income relating to class 21 business as a percentage of the associated technical provisions. The figures concern only activities pursued in Belgium. These figures may differ from the return on the investment portfolio concerned, since the latter is generally slightly larger than the amount of the technical provisions.

(3) Interest rate on the secondary market for ten-year Belgian government bonds (OLOs) (daily data).

(4) A dynamic adjustment to market rates is used.

(5) The maximum rate is subject to the term structure of business written, and may only be allowed if stress tests show that the company is capable of paying these rates.

they increased gradually to about 19 billions in 2005. For class 23 contracts, premium income has been more volatile, equalling the 2000 level in 2005 (7 billions of euro).

From an international perspective, the proportion of premiums collected for class 23 contracts has remained, in recent years, much lower in Belgium than in most other European countries. For the EU as a whole, class 23 contracts accounted for about 40 p.c. of total premiums in 2004, compared to 15 p.c. in Belgium (Chart 44, right-hand panel). One possible explanation is that, in a number of EU countries, policyholders are not entitled to potential bonuses on their guaranteed return contracts, making these less attractive compared to unit-linked contracts. However, in 2005, the share of class 23 premiums in Belgium increased to 26 p.c. of total life insurance premiums.

Life insurance companies also benefited, in 2005, from the favourable developments on equity and bond markets, which allowed the sector to record substantial capital gains. This contributed to the increase in the yield of the investment portfolio. An estimate based on the ratio between the investment income and the technical

provisions of class 21 contracts indicates that this return increased from 4.9 to 5.3 p.c. (Chart 45, left-hand panel). At the same time, the financing constraints raised by the servicing of guaranteed return contracts eased further, as companies steadily lowered the guaranteed rates on new class 21 contracts.

As a result, the margin between the yield insurance companies obtain on their investment portfolio and the average return they guarantee to their policyholders improved further. Negative in 2002, this margin was restored in 2003 and reached 1.4 p.c. in 2005, compared to 0.9 p.c. in 2004. However, part of that margin is distributed to policyholders in the form of bonuses, limiting the increase in the profits of life insurance companies. At a more structural level, the recent increase in long-term interest rates will help to alleviate the burden of class 21 contracts, as market rates rose above the average guaranteed return at the beginning of 2006 (Chart 45, middle panel).

In Belgium, the guaranteed rate for class 21 life insurance contracts is currently subject to a legal ceiling of 3.75 p.c., which is much higher than in most other European

countries, where the ceiling varies between 2 and 3 p.c. (Chart 45, right-hand panel). However, this maximum has become less binding for Belgian insurance companies. Until a few years ago, those companies felt obliged to stick to the maximum rate as a result of competitive pressure, but since then they have progressively reduced their guaranteed rate, on their own initiative, to well below the legal ceiling.

This move is part of a more global trend, whereby insurance companies are trying to introduce more flexibility into their class 21 life insurance contracts. Firstly, they are offering their customers contracts with shorter durations. Secondly, in contrast to the conditions prevailing until the end of the 1990s, when the guaranteed rate valid at the time of conclusion of the contract was applicable to all future premiums, most new contracts only guarantee the rate valid at the time of receipt of the premium, which may thus be adapted to changes in market conditions.

However, most of these new contracts also offer policyholders more flexibility, enabling them to surrender their policies more easily and without incurring major penalties. This exposes insurance companies to increased surrender risk, especially in the event of a sharp rise in interest rates. In such a context, insurance companies would be faced with the choice either to increase the return on their contracts or to accept a reduction in their volume of business, which, in both cases, would depress profitability.

There are some indications that the surrender rates of class 21 policies increased somewhat in 2005. Besides the potential impact of the increase in interest rates, the strong stock market performance in 2005 could also have induced policyholders to shift to class 23 contracts. Insurance companies themselves tend to promote such moves, whereby both the risk and the potential return are transferred to the policyholder.

4.4 Pension funds

The recent success of life insurance products was due largely to the desire of households to accumulate long-term savings in order to supplement their statutory pension. Indeed, with the ageing of the population, the dependency rate, *i.e.* the number of pensioners as a percentage of the number of workers, is increasing, putting pressure on the so-called first pillar of the pension system, based on a pay-as-you-go mechanism. Thus, a second and a third pillar are rapidly developing alongside those statutory pensions. The second pillar, built up at enterprise or sector level, is financed by capitalisation of the contributions paid by employers, self-employed or

employees to a pension institution, be it a pension fund or a company offering group insurance. The third pillar represents supplementary pensions arranged individually, through individual life insurance and mutual funds.

So far, the expansion of the reserves of the extra-legal pension pillars has been unevenly distributed however, as the third pillar has grown faster than the second. Within the second pillar, the sponsoring companies mostly prefer group insurance contracts, rather than pension funds. This might be due to the rather small size of most companies, which find it difficult to manage their own pension funds and prefer to delegate the entire management and sometimes also the risks of post-employment benefits to insurance companies.

As a result, Belgian pension funds have remained relatively small. Their balance sheet total amounted to 11.7 billions of euro at the end of 2004. This represents only 11 p.c. of the technical provisions of Belgian life insurance companies, which amounted to 107.7 billions of euro at the same date. In recent years, the assets of pension funds have also been negatively influenced by the transfer of a number of funds of semi-public institutions, such as the Belgian telecom operator, to the general government sector.⁽¹⁾

However, one might expect those funds to become more important over the coming years, as the government decided in 2003 to widen the access of workers to private second pillar pension schemes. The primary objective of the Supplementary Pensions Act (SPA), which came into force on 1 January 2004, is to make supplementary pensions more accessible to manual workers and SME employees. To that end, the law provides for two types of pension plans in addition to traditional corporate group pensions: sectoral schemes and social schemes.

Sectoral pensions are built up at the level of joint (sub)committees between employers and employees under a collective labour agreement. This procedure makes it compulsory for employers in the sector to arrange membership for all employees covered by the agreement. The SPA also introduces social pension plans. The main feature of these plans is that, in addition to the pension commitments, they comprise a solidarity aspect. They maintain the build-up of supplementary pension rights during periods when the funding is interrupted (*e.g.* by unemployment) and provide other forms of solidarity, such as payment of a benefit in the event of

(1) However, this concerned reserves of first pillar pensions. A number of (semi)public institutions, which are themselves responsible for the management of the first pillar pensions of their employees, choose to fund their legal pension obligations through a pension fund instead of using a pay-as-you-go system.

incapacity for work or serious illness. In addition, in parallel with the SPA, new legislation was adopted relating to second pillar pensions for self-employed persons. The new rules allow self-employed persons and their assistants to build up a supplementary pension with the pension provider of their choice.

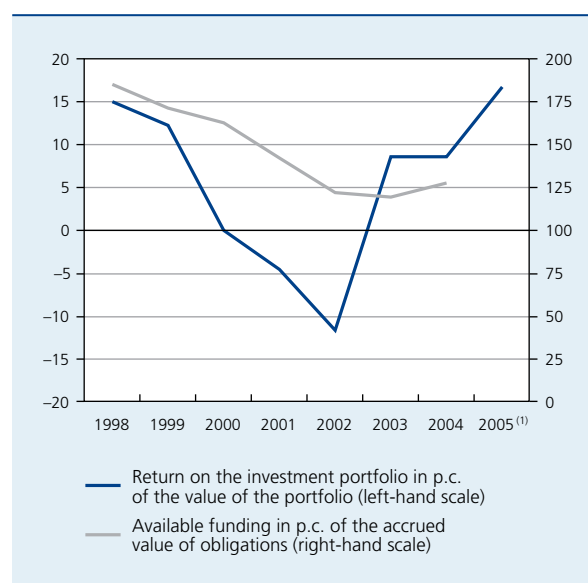
At this stage, it is too soon to draw conclusions concerning the effect of the SPA on the expansion of the second pillar assets, because existing sectoral plans have up until the end of 2006 to comply with the SPA and to actually start funding their pension promises. An increase in the number of sectoral pension plans has, however, already been observed, leading to a higher coverage ratio, *i.e.* the number of active members of such plans as a percentage of total employees in the Belgian private sector, of approximately 50 p.c., compared to 33 p.c. before the introduction of the SPA. This will probably lead to a rise in pension funds' assets in the future.

The share of defined benefit plans remains predominant, although the above-mentioned new law also applies to defined contribution products. However, in the latter case, the enterprises are required to guarantee a minimum annual rate of return of 3.25 p.c. on employers' contributions and 3.75 p.c. on employees' contributions. In a low interest rate environment, corporations might, however, be reluctant to start such plans. For similar reasons, insurance companies, which often take over some obligations from pension funds, might currently be unwilling to take on the risks associated with these guaranteed returns.

Belgian pension funds slightly improved their financial position in 2004, as their funding rose from 120 to 128 p.c. of their obligations, while their return on investment stabilised at 8.6 p.c. (Chart 46). In 2005, this return increased strongly to reach 16.8 p.c., which should have contributed to a further improvement in pension funds' funding, provided that sponsoring companies' contributions remained at the same level. However, as most pension funds in Belgium use a fixed discount rate of 6 p.c. to calculate the present value of their liabilities, the funding position would be revised downward significantly if more market-consistent discount rates were used.

The availability of a funding buffer in excess of the obligations towards members is particularly important for pension funds with substantial investments in shares, as these expose them to potentially large swings in their funding position in the short run. In the future, two developments will encourage pension funds to hold a sufficient buffer. First, a new supervisory framework for pension funds, developed at the European level⁽¹⁾ and currently being implemented in Belgium, will induce pension funds

CHART 46 INDICATORS OF PENSION FUNDS' FINANCIAL POSITION
(Percentages)



Sources: CBFA, Mercer Human Resource Consulting.

(1) Estimate based on a study by Mercer Human Resource Consulting.

to increasingly take into account both their assets and liabilities, and the interaction between the two in order to determine their funding level. Second, the fluctuations in funding will become more apparent in sponsoring companies' accounts as the new IAS/IFRS accounting rules, introduced in 2005, require listed corporations to use market rates to discount their future obligations and to recognise, in their balance sheet, any underfunding of their pension plan.

In order to limit the risk of temporary underfunding, pension funds try to match more closely the duration of their assets and liabilities through investments in long and ultra-long bonds. However, such bonds do not offer a perfect hedge. Even if pension funds are able to invest in indexed bonds, which protect them against fluctuations in the rate of inflation, they are still exposed to the risk of an acceleration in the rate of growth of real wages. In a very long-term perspective, equities could provide better protection as their return is more closely linked to developments in the real economy.

Another important risk which cannot be covered through classical long-term bonds is longevity risk. Pension funds' exposure to the risk that future mortality rates prove to

(1) Directive 2003/41/EC of the European Parliament and of the Council of 3 June 2003 on the activities and supervision of institutions for occupational retirement provision.

be lower than formerly projected depends on the share of pension fund members opting, at retirement, for an annuity instead of a lump sum payment. In order to facilitate the hedging of this risk, the market is starting to issue longevity bonds, which make coupon payments proportional to the number of survivors in a given cohort. The growth of this product will depend on the willingness of market participants to take on those longevity risks. At present, there seem to be few natural underwriters of such risks in the private sector, with the exception of certain life reinsurers, who can offset longevity risk against a decline in claims that would result from lower than expected mortality rates.

Statistical annex

TABLE 1 NUMBER OF BELGIAN CREDIT INSTITUTIONS

	1999	2000	2001	2002	2003	2004	2005
Credit institutions governed by Belgian law with Belgian majority shareholding	48	45	38	36	34	33	26
Credit institutions governed by Belgian law with foreign majority shareholding	27	27	29	29	27	26	28
EU Member States	21	21	22	21	21	20	23
Other States	6	6	7	8	6	6	5
Belgian branches of foreign credit institutions	44	47	46	46	48	45	50
EU Member States	30	34	35	36	38	36	41
Other States	14	13	11	10	10	9	9
Total	119	119	113	111	109	104	104

Source: CBFA.

TABLE 2 BREAKDOWN OF CREDIT INSTITUTIONS GOVERNED BY BELGIAN LAW ACCORDING TO THEIR SHAREHOLDERS' STRUCTURE

	1999	2000	2001	2002	2003	2004	2005
Large credit institutions (including their subsidiaries)	17	15	14	12	11	12	10
Belgian financial groups	5	7	5	5	3	3	3
Financial groups from other EU Member States	21	19	18	19	18	16	17
Financial groups from third countries	5	6	7	5	6	6	5
Belgian or foreign non-financial groups	3	3	3	4	2	2	2
Family structure	13	10	8	9	10	9	6
Professional credit associations	9	9	9 ⁽¹⁾	9 ⁽¹⁾	9 ⁽¹⁾	9 ⁽²⁾	9 ⁽³⁾
Public authorities	2	1	1	1	1	1	1
Consortium structure	–	2	2	1	1	1	1
Limited partnerships	–	–	–	–	–	–	–
Co-operative companies	–	–	–	–	–	–	–
Total	75	72	67	65	61	59	54

Source: CBFA.

(1) Of which 2 are owned by a French bank.

(2) Of which 3 are owned by a French bank.

(3) Of which 5 are owned by a French bank.

TABLE 3 KEY FIGURES FOR THE BELGIAN BANKING SECTOR ⁽¹⁾
(Data on a consolidated basis)

	1999	2000	2001	2002	2003	2004	2005
A. Large banking groups							
Balance sheet total (billions of euro)	797.9	840.6	940.7	907.5	913.2	1,010.7	1,229.2
Customers' holdings (billions of euro)	415.2	440.5	477.0	465.4	453.9	482.1	532.0
Loans and advances to customers (billions of euro)	306.7	352.4	374.8	381.2	384.9	433.2	535.1
Off-balance-sheet forward operations (billions of euro)	2,377.3	2,451.7	3,113.6	3,639.3	4,484.4	6,003.7	5,637.0
Assets and deposits in trust (billions of euro)	647.7	927.6	961.7	932.7	739.0	838.8	963.8
Risk asset ratio (p.c.)	11.8	11.7	12.7	12.8	12.4	12.6	11.1
Net after tax results (billions of euro)	3.2	4.7	3.4	2.9	3.6	4.6	5.7
Return on average assets (p.c.)	0.5	0.6	0.4	0.4	0.4	0.5	0.5
Return on average equity (p.c.)	18.7	22.7	15.0	12.6	14.2	17.3	19.9
Cost-income ratio (p.c.)	69.3	71.5	72.9	73.2	72.8	70.6	72.3
Average yield on assets (p.c.)	5.7	5.9	5.8	5.0	4.0	4.0	4.2
Average cost of funding (p.c.)	4.3	4.7	4.5	3.5	2.6	2.6	3.0
Interest margin (p.c.)	1.4	1.3	1.4	1.5	1.4	1.3	1.2
B. Total of Belgian credit institutions							
Balance sheet total (billions of euro)	926.7	971.3	1,063.7	1,024.6	1,033.0	1,143.2	1,369.3
Customers' holdings (billions of euro)	477.4	504.2	545.0	535.3	531.9	570.1	622.1
Loans and advances to customers (billions of euro)	342.9	392.7	416.3	421.3	428.8	482.9	591.3
Off-balance-sheet forward operations (billions of euro)	2,507.2	2,611.5	3,237.5	4,297.7	4,625.7	6,121.5	5,731.1
Assets and deposits in trust (billions of euro)	4,197.2	5,429.7	9,478.0	12,020.3	12,881.5	14,310.0	9,405.0
Risk asset ratio (p.c.) ⁽²⁾	11.9	11.9	12.9	13.1	12.8	13.0	11.5
Net after tax results (billions of euro)	3.7	5.5	3.8	3.2	4.0	5.2	6.6
Return on average assets (p.c.)	0.4	0.6	0.4	0.4	0.4	0.5	0.5
Return on average equity (p.c.) ⁽²⁾	17.1	20.4	13.7	11.8	13.6	15.8	18.5
Cost-income ratio (p.c.)	69.9	72.2	74.1	74.7	73.9	72.0	72.6
Average yield on assets (p.c.)	5.6	5.9	5.8	4.9	4.0	3.9	4.1
Average cost of funding (p.c.)	4.2	4.6	4.4	3.4	2.6	2.6	2.9
Interest margin (p.c.)	1.4	1.3	1.4	1.5	1.4	1.3	1.2

Source: CBFA.

(1) Credit institutions governed by Belgian law and branches of foreign credit institutions.

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

TABLE 4 MAIN BALANCE-SHEET ITEMS OF BELGIAN CREDIT INSTITUTIONS ⁽¹⁾
(Data on a consolidated basis, billions of euro)

	1999	2000	2001	2002	2003	2004	2005
Assets							
Interbank assets	222.5	198.4	219.9	214.8	206.1	212.6	277.3
Loans and advances to customers	342.9	392.7	416.3	421.3	428.8	482.9	591.3
Securities and other negotiable instruments	294.9	296.5	316.9	291.6	301.0	323.1	368.0
Fixed assets	14.1	15.8	18.8	18.2	17.5	18.9	20.6
Other	52.4	68.0	91.8	78.6	79.7	105.7	112.1
Liabilities							
Interbank liabilities	304.9	286.8	284.8	254.9	257.3	281.6	412.6
Customers' holdings	477.4	504.2	545.0	535.3	531.9	570.1	622.1
Deposits	350.7	369.0	411.8	406.6	416.7	456.1	502.7
Bank bonds and other debt securities	126.7	135.3	133.2	128.8	115.2	113.9	119.5
Subordinated debts	20.4	24.0	27.5	25.8	23.9	23.7	24.3
Own funds	23.1	26.9	28.9	30.5	32.2	35.0	37.0
Other	100.9	129.4	177.5	178.0	187.7	232.9	273.3
Balance sheet total	926.7	971.3	1,063.7	1,024.6	1,033.0	1,143.2	1,369.3

Source : CBFA.

(1) Credit institutions governed by Belgian law and branches of foreign credit institutions.

TABLE 5 BELGIAN CREDIT INSTITUTIONS' LIABILITIES TOWARDS DOMESTIC CUSTOMERS⁽¹⁾
(Data on a consolidated basis, billions of euro)

	1999	2000	2001	2002	2003	2004	2005
Liabilities with an original maturity of more than one year							
Term deposits	10.3	10.5	11.2	10.5	11.4	13.5	14.0
Bank bonds	60.0	57.5	53.0	51.9	44.3	38.8	30.6
Other customers' holdings ⁽²⁾	8.7	5.6	5.2	4.8	6.4	4.5	4.7
<i>Sub-total</i>	<i>79.0</i>	<i>73.5</i>	<i>69.4</i>	<i>67.3</i>	<i>62.1</i>	<i>56.8</i>	<i>49.3</i>
Liabilities with an original maturity of up to one year							
Savings deposits	98.4	92.5	98.5	110.5	129.0	146.9	153.8
Sight deposits	52.9	57.0	60.1	61.9	68.0	77.5	83.4
Deposits with a term							
of up to one month	20.1	18.2	21.9	22.5	19.8	19.8	21.4
of more than one month and up to one year	28.8	30.4	33.3	29.8	28.1	28.5	27.0
Bank bonds with a term of one year	1.5	1.5	1.9	1.0	0.7	0.4	0.3
Other customers' holdings ⁽²⁾	8.2	10.6	7.8	8.1	9.7	8.4	9.6
<i>Sub-total</i>	<i>209.9</i>	<i>210.3</i>	<i>223.6</i>	<i>233.9</i>	<i>255.3</i>	<i>281.5</i>	<i>295.6</i>
Total liabilities collected in Belgium	288.8	283.8	293.0	301.2	317.4	338.3	344.9

Source: CBFA.

(1) Credit institutions governed by Belgian law and branches of foreign credit institutions.

(2) Other customers' holdings include inter alia debt securities and certificates of deposit, special accounts, deposits related to mortgage loans and the deposit protection scheme.

TABLE 6 BELGIAN CREDIT INSTITUTIONS' LOANS AND ADVANCES TO CUSTOMERS ⁽¹⁾
(Data on a consolidated basis, billions of euro)

	1999	2000	2001	2002	2003	2004	2005
Installment loans	13.4	13.7	13.9	14.3	13.5	12.7	13.7
Mortgage loans ⁽²⁾	74.4	79.5	85.0	93.6	117.4	132.0	154.7
Term loans	182.4	209.7	233.0	242.2	230.1	258.3	324.0
Current account advances	35.7	40.6	36.4	34.0	29.6	31.3	42.9
Trade bills and acceptance credits	29.2	38.2	34.5	26.5	24.8	38.3	41.3
Other	7.9	11.0	13.5	10.7	13.4	10.3	14.7
Total	342.9	392.7	416.3	421.3	428.8	482.9	591.3
of which on Belgium	209.1	218.0	220.5	219.3	224.3	234.2	246.1
of which on foreign countries	133.7	174.7	195.8	201.9	204.5	248.7	345.3

Source: CBFA.

(1) Credit institutions governed by Belgian law and branches of foreign credit institutions.

(2) After deduction of deposits related to mortgage loans.

TABLE 7 STRUCTURE OF THE SECURITIES PORTFOLIO OF BELGIAN CREDIT INSTITUTIONS⁽¹⁾
(Data on a consolidated basis, billions of euro)

	1999	2000	2001	2002	2003	2004	2005
Total investment portfolio	268	254	265	239	237	243	271
Government securities portfolio	175	154	168	149	156	154	168
Long-term Belgian government securities	101	86	76	67	64	59	59
Short-term Belgian government securities	11	7	7	8	4	1	2
Long-term foreign government securities	48	54	79	72	86	93	105
Short-term foreign government securities	15	7	6	3	2	2	2
Securities of credit institutions	43	44	41	34	34	40	48
Securities of other companies	45	49	50	50	43	46	52
Non-interest-bearing securities	5	6	6	5	3	3	4
Total trading portfolio	27	43	52	52	64	79	97
Government securities portfolio	16	21	23	23	23	28	22
Long-term Belgian government securities	5	5	4	5	5	6	4
Short-term Belgian government securities	4	5	4	3	3	3	2
Long-term foreign government securities	6	11	14	11	12	15	13
Short-term foreign government securities	0	1	2	3	2	3	2
Securities of credit institutions	2	2	6	8	11	9	13
Securities of other companies	4	8	10	13	14	14	18
Non-interest-bearing securities	6	11	12	8	15	28	44
Total portfolio	295	296	317	291	301	322	368

Source: CBFA.

(1) Credit institutions governed by Belgian law and branches of foreign credit institutions.

TABLE 8 BREAKDOWN OF OFF-BALANCE-SHEET FORWARD OPERATIONS OF BELGIAN CREDIT INSTITUTIONS ⁽¹⁾
(Data on a consolidated basis, billions of euro)

	1999	2000	2001	2002	2003	2004	2005
Foreign exchange							
Forward exchange operations	328	268	266	297	311	360	360
Currency futures	1	1	1	0	0	0	0
Forward exchange rate contracts	0	0	3	6	9	2	6
Interest and currency swaps	47	51	57	61	58	63	86
Currency options	26	38	41	69	91	79	82
<i>Sub-total</i>	<i>402</i>	<i>358</i>	<i>368</i>	<i>432</i>	<i>468</i>	<i>503</i>	<i>534</i>
Interest rates							
Interest rate contracts	230	134	131	268	194	170	171
Interest rate futures	76	52	74	86	82	91	96
Deposit contracts	2	3	5	1	5	4	6
Interest rate swaps	1,525	1,507	1,880	2,528	2,742	4,171	3,404
Interest rate options	174	375	550	743	889	983	1,191
<i>Sub-total</i>	<i>2,006</i>	<i>2,071</i>	<i>2,640</i>	<i>3,627</i>	<i>3,912</i>	<i>5,419</i>	<i>4,868</i>
Others							
Other forward contracts, futures and swaps	25	25	29	23	22	25	22
Other options	73	157	200	215	223	174	306
<i>Sub-total</i>	<i>98</i>	<i>181</i>	<i>229</i>	<i>238</i>	<i>245</i>	<i>199</i>	<i>329</i>
Total	2,507	2,611	3,237	4,297	4,625	6,121	5,731

Source : CBFA.

(1) Credit institutions governed by Belgian law and branches of foreign credit institutions.

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

(Data on a consolidated basis, billions of euro unless otherwise stated)

	1999	2000	2001	2002	2003	2004	2005
Own funds sensu stricto ("tier 1 capital") ⁽¹⁾	28.6	30.6	33.2	34.2	34.3	37.9	39.2
of which hybrid instruments	1.7	1.7	2.8	2.7	2.4	3.1	3.6
Additional items of own funds for credit and market risks ("tier 2 capital")	18.1	20.8	22.3	20.5	18.4	17.5	17.9
of which upper tier 2 ⁽²⁾	6.3	7.0	7.2	5.9	5.4	5.0	4.6
of which lower tier 2 ⁽³⁾	11.9	13.9	15.1	14.6	12.9	12.5	13.3
Deduction of participations	-2.7	-3.8	-3.9	-3.7	-3.9	-4.2	-4.8
<i>Total</i>	<i>44.0</i>	<i>47.7</i>	<i>51.6</i>	<i>50.9</i>	<i>48.8</i>	<i>51.2</i>	<i>52.3</i>
Additional items of own funds for market risks only ("tier 3 capital") ⁽⁴⁾	1.0	1.6	2.6	1.9	2.1	2.1	1.3
Risk asset ratio (p.c.)	11.9	11.9	12.9	13.1	12.8	13.0	11.5

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 COMPONENTS OF THE INCOME STATEMENT OF BELGIAN CREDIT INSTITUTIONS ⁽¹⁾

(Data on a consolidated basis, billions of euro)

	1999	2000	2001	2002	2003	2004	2005
Net interest income	11.40	11.73	12.26	12.67	12.17	12.80	12.69
Investment income other than net interest income ⁽²⁾	2.97	3.30	3.52	2.73	2.44	2.39	2.62
Other income ⁽³⁾	7.73	10.44	10.01	9.19	8.23	8.99	10.19
Banking income	22.10	25.47	25.79	24.59	22.84	24.18	25.50
Operating expenses (-) ⁽⁴⁾	15.46	18.38	19.09	18.36	16.89	17.41	18.50
of which personnel expenses	6.88	7.68	8.17	8.13	7.68	7.79	7.92
Gross operating results	6.64	7.09	6.70	6.24	5.95	6.77	7.00
Value adjustments (-)	1.67	1.51	1.57	2.17	1.49	0.46	-0.41
Exceptional results	0.06	1.97	0.15	0.54	0.49	0.11	0.22
Income taxes and transfers (-)	1.24	1.98	1.47	1.07	1.12	1.56	1.51
Portion of the result of undertakings included in the consolidated accounts according to the equity method	0.19	0.38	0.34	0.01	0.32	0.54	0.71
Third-party interest in the result of consolidated subsidiaries (-)	0.30	0.40	0.38	0.35	0.16	0.22	0.22
Consolidated results ⁽⁵⁾	3.68	5.55	3.77	3.19	3.98	5.19	6.61

Source : CBFA.

(1) Credit institutions governed by Belgian law and branches of foreign credit institutions.

(2) Income from equities and other variable-interest securities, income from financial fixed assets, result on the realisation of securities and investment instruments and net profits or losses on trading and foreign-exchange operations.

(3) Fee income and other operating income.

(4) Including depreciation/amortisation on intangible and tangible fixed assets.

(5) Group share.

TABLE 11 NUMBER OF BELGIAN INSURANCE COMPANIES

	1999	2000	2001	2002	2003	2004	2005
A. By the location of their registered office							
Belgium ⁽¹⁾	137	130	125	123	118	118	110
European Economic Area ⁽²⁾	79	73	71	73	66	60	58
Rest of the world ⁽³⁾	6	6	6	6	5	3	3
Total	222	209	202	202	189	181	171
Free service provision ⁽⁴⁾	556	589	613	629	670	681	740
B. By specialization⁽⁵⁾							
Life insurance	31	29	28	30	31	31	30
Non-life insurance	154	145	140	140	127	122	116
Life and non-life insurance	37	35	34	32	31	28	25
Total	222	209	202	202	189	181	171

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 BELGIAN INSURANCE COMPANIES' ASSETS ⁽¹⁾
(Data on a company basis, billions of euro)

	1999	2000	2001	2002	2003	2004
Investments	86.0	94.9	104.1	110.3	125.2	143.3
All activities with the exception of class 23	77.5	81.7	87.6	94.6	107.9	124.4
Shares ⁽²⁾	13.9	15.7	18.1	15.8	13.8	15.1
Debt securities	48.8	51.1	53.9	58.9	72.2	88.2
Land and buildings	2.0	1.9	2.0	2.4	2.4	2.6
Mortgage loans	5.0	5.0	5.3	5.9	5.7	5.7
Investments in affiliated undertakings	4.8	4.9	5.1	7.4	8.0	8.2
Others	2.9	3.1	3.2	4.2	5.8	4.6
Class 23	8.5	13.2	16.4	15.8	17.3	18.9
Shares ⁽²⁾	7.5	11.9	14.5	13.1	13.4	13.7
Debt securities	0.6	1.0	1.5	2.1	2.6	3.2
Others	0.4	0.3	0.4	0.6	1.3	2.0
Reinsured part of technical provisions	4.5	4.8	5.7	6.0	6.2	6.6
Claims and other assets	8.3	8.6	9.0	9.8	11.0	13.8
Total	98.8	108.3	118.7	126.1	142.4	163.7

Source: CBFA.

(1) Insurance companies supervised by the CBFA.

(2) Including shares in UCIFs.

TABLE 13 MAIN COMPONENTS OF BELGIAN INSURANCE COMPANIES' LIABILITIES⁽¹⁾
(Data on a company basis, billions of euro)

	1999	2000	2001	2002	2003	2004
Own funds	7.5	8.1	8.6	7.9	8.8	9.4
Technical provisions	81.5	89.9	99.9	107.8	121.8	138.8
Life insurance (with the exception of class 23)	50.3	52.5	57.0	64.8	76.2	89.9
Class 23	8.5	13.2	16.6	16.0	17.5	19.2
Non-life insurance	18.7	20.1	21.7	22.4	23.1	24.2
Others	3.9	4.1	4.5	4.6	5.0	5.5
Reinsurance companies' deposits	2.0	2.0	2.3	2.3	2.4	2.5
Creditors' claims	6.3	6.9	6.7	6.9	8.2	11.8
Other liabilities	1.5	1.4	1.2	1.2	1.2	1.2
Total	98.8	108.3	118.7	126.1	142.4	163.7

Source: CBFA.

(1) Insurance companies supervised by the CBFA.

TABLE 14 COMPONENTS OF THE INCOME STATEMENT OF BELGIAN INSURANCE COMPANIES ⁽¹⁾
(Data on a company basis, billions of euro unless otherwise stated)

	1999	2000	2001	2002	2003	2004
A. Technical account in life insurance						
Net premiums written	10.0	12.8	13.1	14.4	17.7	20.0
Claims paid (-)	4.3	4.8	5.4	6.9	7.9	8.5
Change in the provisions for claims (-)	8.3	9.1	7.8	6.4	12.9	15.2
Premiums after insurance costs	-2.7	-1.1	-0.1	1.2	-3.1	-3.7
Net operating expenses (-)	1.0	1.0	1.1	1.1	1.2	1.2
Result before investment income	-3.7	-2.2	-1.2	0.0	-4.3	-4.9
Net investment income	4.8	3.2	2.0	-0.3	4.8	5.7
Technical result life insurance	1.2	1.0	0.8	-0.2	0.5	0.8
B. Technical account in non-life insurance						
Net premiums written	7.0	7.3	7.8	8.5	9.1	9.6
Claims paid (-)	5.0	5.3	5.8	5.9	5.7	5.7
Change in the provisions for claims (-)	0.7	0.6	0.9	0.9	0.8	1.0
Premiums after insurance costs	1.3	1.4	1.2	1.7	2.6	2.9
Net operating expenses (-)	2.4	2.3	2.5	2.7	2.8	2.9
Result before investment income	-1.1	-0.9	-1.4	-1.0	-0.2	0.0
Net investment income	1.9	1.5	1.4	0.7	1.0	1.2
Technical result non-life insurance	0.8	0.6	0.0	-0.3	0.8	1.2
C. Non-technical account						
Total technical result life and non-life insurance	2.0	1.6	0.8	-0.5	1.3	2.0
Residual net investment income	0.6	0.5	0.6	0.1	-0.2	0.3
Other and exceptional results and taxes	-0.5	-0.3	-0.4	-0.4	-0.4	-0.6
Net result	2.0	1.7	1.0	-0.8	0.6	1.7
<i>p.m. Return on equity (p.c.)</i>	26.9	21.5	12.1	-10.4	7.3	18.0

Source: CBFA.

(1) Insurance companies supervised by the CBFA.

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

	1999	2000	2001	2002	2003	2004
Explicit margin	7,717	7,953	8,555	8,238	9,467	10,707
<i>p.c. of required margin</i>	200	194	197	173	179	181
Implicit margin	2,585	2,894	3,454	3,853	3,634	4,172
Future profits of life insurance activities	1,423	1,667	1,968	1,855	1,874	755
Unrealised capital gains	1,162	1,227	1,486	1,998	1,761	3,417
<i>p.c. of required margin</i>	67	71	79	81	69	71
Total margin	10,302	10,847	12,008	12,091	13,101	14,879
<i>p.c. of required margin</i>	267	265	276	254	248	252

Source : CBFA.

(1) Insurance companies supervised by the CBFA.

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

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

	1999	2000	2001	2002	2003	2004	2005
Bonds	49.9	48.4	48.1	50.0	52.7	55.8	57.4
Equities	27.3	25.8	24.1	14.6	12.9	12.7	13.9
Real estate	3.3	3.0	2.8	3.1	2.8	2.4	2.2
Loans	5.7	5.6	5.6	5.6	4.7	3.6	2.7
UCITS	4.5	8.0	10.2	15.6	15.6	15.1	16.2
Others	9.3	9.2	9.3	11.1	11.3	10.3	7.6
Total (billions of euro)	83.7	87.9	98.0	110.5	127.6	147.3	168.8

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)

	1999	2000	2001	2002	2003	2004	2005
Number of companies	49	46	43	40	37	36	31
of which with a majority of institutional shareholders	10	12	11	12	10	10	8
Securities portfolio for own account (billions of euro) ⁽¹⁾⁽³⁾	7.61	7.71	10.95	12.00	18.60	1.89	0.25
Equity	1.91	2.47	1.96	1.67	3.42	0.13	0.11
Debt securities	0.28	0.46	1.55	1.80	1.79	0.38	0.10
Other financial instruments ⁽²⁾	5.42	4.78	7.44	8.53	13.39	1.38	0.04
Balance sheet total (billions of euro) ⁽³⁾	6.59	6.94	9.71	9.88	15.48	3.11	2.37
Deposits in trust (billions of euro) ⁽⁴⁾	0.99	1.16	1.17	0.90	0.71	0.94	1.14
Securities in trust (billions of euro)	15.5	16.2	20.7	19.7	32.8	28.4	41.1
Regulatory own funds (billions of euro)	0.34	0.45	0.38	0.33	0.23	0.26	0.29
Risk asset ratio (p.c.)	20.8	31.4	22.0	17.7	16.2	36.0	58.2
Income (billions of euro) ⁽³⁾	0.50	0.50	0.28	0.34	0.31	0.19	0.27
Fees and commissions	0.18	0.23	0.12	0.10	0.09	0.12	0.17
On trading for own account	0.26	0.23	0.11	0.19	0.15	-0.01	0.02
Operating expenses (billions of euro) ⁽³⁾	0.21	0.27	0.29	0.35	0.32	0.18	0.20
Net after tax results (billions of euro) ⁽³⁾	0.28	0.23	0.02	0.00	0.02	0.05	0.08
Return on average equity (p.c.) ⁽⁵⁾	58.6	31.8	2.9	0.6	2.7	11.9	22.9

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) Mainly composed of options.

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

(4) Funds (cash) held by stockbroking firms for their customers' account must be deposited on a global or individualised customer account opened with an authorised institution, in accordance with the regulations on segregation of customers' funds.

(5) 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 COMPANIES

(Data on a company basis)

	1999	2000	2001	2002	2003	2004	2005
Number of companies	27	31	34	33	30	30	23
of which with a majority of institutional shareholders	10	13	17	16	15	14	8
Assets under management (billions of euro)	99.6	174.1	144.2	135.6	183.3	191.7	32.4
Balance sheet total (billions of euro)	0.37	0.66	0.67	0.77	1.08	1.21	0.08
Own funds (billions of euro)	0.25	0.40	0.42	0.43	0.65	0.70	0.05
Income (billions of euro)	0.20	0.50	0.55	0.58	0.77	0.88	0.07
Operating expenses (billions of euro)	0.11	0.33	0.37	0.27	0.48	0.54	0.04
Net after tax results (billions of euro)	0.05	0.12	0.13	0.22	0.21	0.26	0.02
Return on average equity (p.c.)	21.5	30.0	31.5	50.2	32.9	37.8	39.0

Source: CBFA.

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

	1999	2000	2001	2002	2003	2004	2005
Number of companies	-	-	-	-	-	-	5
Assets under management (billions of euro)	-	-	-	-	-	-	211.4
Balance sheet total (billions of euro)	-	-	-	-	-	-	1.4
Own funds (billions of euro)	-	-	-	-	-	-	0.7
Income (billions of euro)	-	-	-	-	-	-	0.9
Operating expenses (billions of euro)	-	-	-	-	-	-	0.6
Net after tax results (billions of euro)	-	-	-	-	-	-	0.3
Return on average equity (p.c.)	-	-	-	-	-	-	40.6

Source: CBFA.

TABLE 20 BELGIAN UNDERTAKINGS FOR COLLECTIVE INVESTMENT

	1999	2000	2001	2002	2003	2004	2005
A. Number per legal form (end of period)							
Investment companies	96	103	108	108	105	108	108
Number of compartments	1,499	1,851	1,951	1,987	1,252 ⁽⁵⁾	1,365	1,477
Investment funds	12	14	16	16	16	18	17
Pension-savings funds ⁽¹⁾	12	11	10	10	11	12	12
Real estate UCITS ⁽²⁾	13	13	12	11	11	11	12
Undertakings for investment in receivables ⁽³⁾	9	9	9	10	10	9	7
Venture capital UCITS ⁽⁴⁾	1	1	2	2	2	2	2
Total	143	151	157	157	155	160	158
B. Assets (billions of euro)							
1. Net asset value end of preceding year	51.80	70.34	83.51	88.32	78.26	85.05	95.34
2. Subscriptions	24.28	33.65	26.43	18.31	20.32	23.15	37.60
3. Redemptions	11.34	16.58	14.53	14.87	16.86	17.58	22.26
4. Net amounts invested (4 = 2 - 3)	12.94	17.08	11.90	3.44	3.47	5.57	15.34
5. Costs	0.73	1.08	1.06	0.99	0.99	1.14	1.18
6. Capital gains or losses	6.32	-2.82	-6.03	-12.51	4.31	5.86	2.64
7. Net asset value end of period (7 = 1 + 4 - 5 + 6)	70.34	83.51	88.32	78.26	85.05	95.34	112.14

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 FOREIGN UNDERTAKINGS FOR COLLECTIVE INVESTMENT DISTRIBUTED IN BELGIUM

	1999	2000	2001	2002	2003	2004	2005
A. Number of undertakings (end of period)							
Per legal form							
Investment companies	178	188	198	194	197	184	170
Number of compartments	1,721	1,901	2,029	2,036	2,067	2,030	2,122
Investment funds	79	76	76	70	70	61	46
Total	257	264	274	264	267	245	216
Per category							
Undertakings with UCITS-passport	219	227	239	230	218	206	198
Number of compartments	1,530	1,732	1,880	1,891	1,925	1,918	2,023
Undertakings without UCITS-passport	38	37	35	34	49	39	18
Number of compartments	191	169	149	145	142	112	99
Total	257	264	274	264	267	245	216
B. Net amounts invested (billions of euro)							
Subscriptions in Belgium							
Investment companies	12.95	14.47	11.08	12.08	12.14	11.21	26.39
Investment funds	0.19	0.12	0.05	0.32	0.03	1.02	3.64
Total	13.14	14.59	11.13	12.39	12.17	12.23	30.03
Redemptions in Belgium							
Investment companies	9.66	15.35	11.26	11.41	11.89	11.98	22.12
Investment funds	0.11	0.10	0.04	0.17	0.05	0.13	0.17
Total	9.78	15.45	11.30	11.58	11.94	12.11	22.30
Net amounts invested in Belgium							
Investment companies	3.29	-0.88	-0.18	0.67	0.26	-0.77	4.27
Investment funds	0.07	0.01	0.01	0.14	-0.02	0.89	3.46
Total	3.36	-0.86	-0.17	0.81	0.24	0.12	7.73

Source: CBFA.

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

	1999	2000	2001	2002	2003	2004	2005
Bond funds	30.25	29.88	32.83	31.22	31.73	35.33	52.92
Medium-term funds	1.34	1.04	1.44	1.75	1.89	1.83	1.47
Money market funds	4.56	3.80	5.03	6.29	5.71	6.16	5.92
Equity funds	31.98	40.26	37.36	24.71	26.72	27.86	39.71
Funds with capital protection	27.01	27.63	29.20	31.77	35.90	41.40	41.70
Balanced funds	17.76	24.65	27.00	21.95	22.85	23.42	25.57
Pension-savings funds	7.95	7.68	7.41	6.40	7.42	8.69	10.32
Real estate funds	3.14	3.05	3.27	3.39	3.85	4.42	5.59
Private equity funds	0.05	0.13	0.13	0.07	0.08	0.09	0.14
Miscellaneous	0.04	0.10	0.03	0.02	0.02	0.10	0.47
Total	124.08	138.22	143.70	127.57	136.17	149.28	183.81

Source: BEAMA.

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

	1999	2000	2001	2002	2003	2004	2005
1. Shares							
Belgian companies	2.01	7.03	0.19	0.35	0.35	3.56	1.83
Foreign companies	0.17	0.78	0.06	0.12	0.03	0.09	0.02
<i>Total</i>	<i>2.18</i>	<i>7.81</i>	<i>0.25</i>	<i>0.47</i>	<i>0.38</i>	<i>3.65</i>	<i>1.84</i>
2. Fixed income securities							
2.1 <i>Bonds</i>	<i>2.49</i>	<i>0.18</i>	<i>0.06</i>	<i>0.38</i>	<i>1.23</i>	<i>5.52</i>	<i>4.97</i>
Belgian companies	0.28	0.11	0.00	0.01	0.05	0.23	0.38
Foreign companies	2.21	0.07	0.06	0.37	1.18	5.29	4.59
2.2 <i>Fixed income securities with capital at risk⁽¹⁾</i>	<i>n.</i>	<i>3.19</i>	<i>1.34</i>	<i>1.50</i>	<i>0.34</i>	<i>0.27</i>	<i>0.55</i>
Belgian companies	<i>n.</i>	<i>0.14</i>	<i>0.11</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>
Foreign companies	<i>n.</i>	<i>3.06</i>	<i>1.23</i>	<i>1.50</i>	<i>0.34</i>	<i>0.27</i>	<i>0.55</i>
2.3 <i>Total</i>	<i>2.49</i>	<i>3.37</i>	<i>1.40</i>	<i>1.88</i>	<i>1.57</i>	<i>5.78</i>	<i>5.52</i>
3. Subordinated debt issued by credit institutions	2.20	1.79	1.16	0.05	0.66	0.96	1.05
4. Government debt							
4.1 <i>Linear bonds (OLOs)</i>	28.3	32.1	26.0	26.1	23.3	22.4	23.3
4.2 <i>Other bonds and notes</i>	1.05	1.22	1.04	1.30	1.28	0.88	0.58
4.3 <i>Treasury certificates⁽²⁾</i>	-6.81	-3.48	1.38	0.06	-0.84	-0.14	0.85

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 attractive investment yield of these financial securities is the premium for the put option that the investor writes on a corporate security.

(2) Net issues.

Resilience of Financial Infrastructure

Overall framework : general oversight principles

The resilience of the Belgian financial infrastructure is a prominent policy objective of the NBB. As overseer of payment and securities settlement systems, the NBB has an explicit objective to promote the safety and efficiency of the systems. The NBB oversees a variety of infrastructures which are based in Belgium or which are of systemic importance for the Belgian financial sector.

In May 2005 the CPSS issued a report on central bank oversight of payment and settlement systems⁽¹⁾. The five general principles for effective oversight included in this report serve as a good guide for a general description of the oversight function of the NBB. They may also be used as a convenient framework to structure the conceptual analysis undertaken as background to this oversight function and published in various issues of the FSR.

General oversight principle A : Transparency

Central banks should set out publicly their oversight policies, including the policy requirements or standards for systems and the criteria for determining which systems these apply to.

The oversight responsibilities of the NBB are set out explicitly in article 8 of its organic law that states that the NBB "... shall supervise the smooth operation of the clearing and payment systems and shall satisfy itself that they are efficient and sound..." As mentioned explicitly

in the explanatory memorandum of this law, the clearing and payment systems referred to also involve securities clearing or settlement systems.

In general, the NBB's policies with regard to its oversight activities, including the relevant standards, are publicly disclosed. They are made public in the NBB's Annual Report, in the NBB's Financial Stability Review (FSR) and via the NBB's website.

The table on the next page gives an overview of the NBB's disclosure for each system it oversees.

It is generally accepted that overseers should be transparent about their responsibilities and policies, the practical organisation and the process of oversight, and the methodologies used. When it comes to disclosing the results of oversight assessments, central banks tend to be more cautious, as there might also be some disadvantages in doing so. The first article in this part of the FSR is devoted to "Public disclosure of central banks' oversight activities".

General oversight principle B : International standards

Central banks should adopt, where relevant, internationally recognised standards for payment and settlement systems.

Assessment is generally based on existing international standards. The applicable standards which the NBB uses for its oversight are established by the central banks of the Group of Ten countries (G10), sometimes in collaboration with securities commissions, or by the Eurosystem. All

(1) BIS (2005), "Central Bank Oversight of Payment and Settlement Systems", Committee on Payment and Settlement Systems, Bank for International Settlements, May, www.bis.org.

TABLE 1 OVERVIEW OF SYSTEMS OVERSEEN BY THE NBB

	International cooperative oversight		NBB solo overseer	Cooperation with CBFA	Disclosure by NBB	
	NBB lead overseer	NBB participates, other CB is lead	With peer review by eurosystem		Responsibilities processes organisation	Results of assessments
Payment systems						
CEC			X		X	X
ELLIPS			X		X	X
CLS		X			X	
Card schemes						
Banksys			X		X	
Master Card Europe			X		X	
Securities settlement systems						
Euroclear	X			X	X	X
CIK (Euroclear Belgium)			X	X	X	
NBB Clearing			X		X	X
CCP						
Cleernet		X		X	X	
Others						
SWIFT	X				X	

these standards have been subject to market consultation prior to their publication.

For ELLIPS, the NBB uses the CPSS Core principles for systemically important payment systems (2001), while for the CEC it refers to the Eurosystem's Oversight Standards for Euro Retail Payment Systems (2003). The oversight of Belgium based securities settlement systems (SSS) relies on the CPSS-IOSCO Recommendations for SSS (2001) and its assessment methodology (2002). For Euroclear, the results have been presented in an article of the FSR 2005 on "Assessment of the Euroclear system against CPSS-IOSCO Recommendations for securities settlement systems". For SSSs, it should be mentioned that the NBB intends to issue interpretative notes aiming at further clarifying the assessment criteria used to assess the settlement system against international standards, where relevant.

With regard to SWIFT, the central bank community has not yet established applicable standards. Currently, SWIFT oversight is based on best practices, e.g. those deduced from the principles established for auditing information technology, for outsourcing or for business continuity planning. The central banks involved in the SWIFT oversight are in the process of establishing an assessment framework that would accommodate SWIFT's specific structures, processes and risk management.

More generally, the NBB takes best practices into account where appropriate in its analysis of the resilience of the financial infrastructure to both operational and financial risk. This emphasis is illustrated by a second article in this part "Measuring liquidity risk in systems providing payment and settlement services: statistical approaches for overseers".

General oversight principle C : Effective powers and capacity

Central banks should have the powers and capacity to carry out their oversight responsibilities effectively.

The NBB's effective powers to obtain information regarding the system and to induce changes when needed are in general based on moral suasion.

The NBB has concluded a bilateral protocol with the operator of each of the systems it oversees, specifying the practical oversight details, such as the aim of the oversight, the types and frequency of oversight meetings, the collection of information and the relevant standards.

In the context of the Euroclear restructuring, which was described in the section devoted to Financial Infrastructure of the Overview of the FSR 2004, a recent protocol formalising the oversight relationship has been concluded between the NBB, Euroclear Bank (EB) and Euroclear SA (ESA). It strengthens the current oversight practices, as it makes provision for the NBB to validate the information provided by Euroclear through on-site inspections at EB and ESA. Also, in the case of the oversight of SWIFT, the protocol provides for on-site reviews by overseers.

For SSSs, the Belgian law envisages that a Royal Decree can set out the standards for the oversight by the NBB, the NBB's information provision requirements, and the coercive measures which the NBB can take when the settlement institutions no longer satisfy the requirements that apply to them. To date, no such Royal Decree has been passed as the NBB is satisfied with the effectiveness of its moral suasion tools.

In defining its responsibilities and powers vis-à-vis the systems overseen, the NBB made it clear that its oversight does not result in any certification of the operator or the system operated, nor does the NBB oversight imply formal approval of the operator's projects. Primary responsibility for the security and efficiency of the system lies with the system operator itself.

General oversight principle D: Consistency

Oversight standards should be applied consistently to comparable payment and settlement systems, including systems operated by the central bank.

The NBB aims at preventing its oversight activity from distorting competition, and therefore applies policy requirements and standards consistently across systems. Comparable systems overseen by the NBB are subject to the same policy. Within the NBB, the Oversight Group – a unit in the International Cooperation and Financial Stability Department – is in charge of the oversight of payment and settlement systems. Structural conflicts of interest between the oversight group and NBB operational services operating a payment or settlement system or providing payment services are resolved by segregating these activities by means of Chinese walls. Operating activities and oversight are managed by two different departments and report to two different NBB Board members. Potential conflicts of interest will be decided upon at NBB Board level.

For ELLIPS and the CEC, as for other euro area Systemically Important Payment Systems (SIPS) and retail payment systems, peer reviews of the assessment take place at the level of the Eurosystem. These aim at creating a level playing field for payment systems within the euro area. Each central bank remains responsible for the assessment of the systems it oversees, but those individual assessments are compared for consistency.

The issue of consistency is relevant, in particular, with respect to the assessment of cross-border links between securities settlement systems. A third article in this part is devoted to “Cross-border securities settlement and risk analysis framework for cross-border links”. It refines the methodology used for compliance with CPSS-IOSCO standard 19 on risks in cross-border links.

General oversight principle E: Cooperation with other authorities

Central banks, in promoting the safety and efficiency of payment and settlement systems, should cooperate with other relevant central banks and authorities.

Within Belgium, the respective competencies of the Banking, Finance and Insurance Commission (CBFA) as a market regulator and as a prudential supervisor and those of the NBB as an overseer lead to cooperation between the two entities in the field of securities clearing and settlement. They assist each other mutually without prejudice to their statutory powers, aiming at minimising the duplication of effort and the burden on the system overseen, to forge a consistent policy approach and to avoid possible gaps.

Payment and settlement systems are to be distinguished from the institution operating the payment or settlement system. SSS operators, with the exception of the NBB, are subject to prudential supervision by the CBFA. This includes Euroclear Bank and Euroclear Belgium and the designated assimilated institution ESA, the Euroclear group entity which owns the group's (I)CSDs and which provides operational services for them. The NBB oversight of SSSs includes the activity of this assimilated entity.

In particular, regarding Euroclear, a protocol between the CBFA and the NBB, approved by Royal Decree, specifies how the two institutions will cooperate in order to coordinate their annual control plans, to harmonise as far as possible the reporting of incidents by Euroclear, to coordinate or conduct jointly their contacts with the internal and

external audit, and to mutually exchange and discuss the results of the inspections and of the oversight missions. The NBB and the CBFA also coordinate their contacts with foreign authorities.

The NBB has established international cooperation schemes both regarding the oversight and supervision of the Euroclear systems and entities and regarding the oversight of SWIFT. These cooperative schemes were described in an article in the 2005 FSR on "Cooperative oversight of Euroclear and SWIFT".

Cooperation between authorities is in particular important in the development of national business continuity planning initiatives as described in the fourth article under this chapter: "The Belgian Financial Stability Committee initiatives on business continuity planning".

Public disclosure of central banks' oversight activities⁽¹⁾

Introduction

The main motivation for a central bank's disclosure of its oversight activities is that it increases transparency on the nature of this function, and promotes accountability. Disclosure of oversight activities can cover different elements; typically these are:

- the overseers' oversight responsibilities and policies;
- the practical organisation and the process of the oversight;
- the methodologies used in the oversight assessments;
- the results of oversight assessments.

As for the overseers' responsibilities and policies, it is accepted within the central bank community that these should be disclosed, as stated explicitly in the Core Principles report (Central bank responsibility A: "The central bank should define clearly its payment systems objectives and should disclose publicly its role and major policies with respect to systemically important payment systems") and in the 2005 Oversight Report (General oversight principle A – Transparency: "Central banks should set out publicly their oversight policies, including the policy requirements or standards for systems and the criteria for determining which systems these apply to."). The NBB has disclosed its oversight responsibilities and policies on various occasions, on its website, in its Annual Report, and in its Financial Stability Review (FSR).

Disclosure of the practical organisation and the processes of the oversight is especially relevant in the case of (international) cooperative oversight. It is beneficial for transparency to disclose which authorities are involved in the oversight of a system, and on what basis, and to describe their various roles and responsibilities. Also, in cases where an overseer cooperates (nationally) with another authority

(such as a banking supervisor), disclosure of their respective roles increases transparency and accountability. The NBB has disclosed the arrangements for the international cooperative oversight for SWIFT and Euroclear on the website and in the FSR⁽²⁾. The arrangements for Cooperation with the CBFA, the Belgian banking supervisor of Euroclear bank (the operator of the Euroclear system) were also disclosed in this same article of the FSR.

There are some clear merits in disclosing assessment methodologies. Some of the Core Principles and the Recommendations for SSSs (as well as the guidance on their implementation and the assessment methodology) are expressed in rather general terms, which may give room for some degree of interpretation. Therefore disclosing the detailed methodologies that have been developed is useful for increasing transparency, promoting emergence of best practices, and stimulating discussions between overseers. This part of the FSR devoted to the Resilience of financial infrastructure includes two articles on detailed assessment methodologies. The first relates to the requirement that a system should, at a minimum, ensure timely settlement in the event that the participant with the largest payment obligation is unable to settle (as required in the Core Principles and the CPSS-IOSCO Recommendations). The second concerns CPSS-IOSCO standard 19 ("CSDs that establish links to settle cross-border trades should design and operate such links to reduce effectively the risks associated with cross-border settlements").

(1) The main author of this article is Johan Pissens.

(2) Cooperative oversight of Euroclear and SWIFT, FSR 2005, National Bank of Belgium.

The fourth element of public disclosure relates to the results of oversight assessments. The key question is to what extent does disclosure of results contribute to (or support) the fulfilment of the oversight objectives, the promotion of safe and efficient payment systems, and more generally of financial stability. Whereas it is accepted that this is the case for disclosure of oversight responsibilities, processes and methodologies, this is far less obvious for disclosure of assessment results.

A further distinction should be made between regular, periodic disclosure, and disclosure in emergency situations, when the overseer wants to urgently inform users of some potential (systemically relevant) risks in the use of the system overseen. “Emergency” disclosure is beyond the scope of this article, which will focus on “regular” disclosure of results.

1. General criteria

It can be argued that disclosure of assessment results could have a positive impact on market discipline, and that it might be an instrument for strengthening moral suasion (in view of the threat of disclosure of failure to implement the overseers’ recommendations). However, for the disclosure of results of assessments to be useful and effective (i.e. to increase transparency and to promote the central bank’s accountability, as well as to promote the oversight objectives of safety and efficiency and financial stability), there are a number of prerequisites to be fulfilled:

- there should already have been some disclosure on the elements mentioned above (responsibilities, organisation of the oversight, methodologies). It should be clear in what capacity a central bank discloses results of assessments, what its responsibilities are, the methodology and approach used to arrive at the results, what its limits are. This is also important for avoiding giving unfounded assurance to the system’s users;
- the assessment should be based on an accepted framework of relevant standards. In the absence of such a framework, it is problematic to disclose any results, as their relevance might be questionable;
- the degree of confidential information contained in the disclosed assessment results should be minimal, certainly in situations where the system is operating in a competitive environment. Competitors may use confidential information that has been disclosed, and litigation risks might be created for the overseer;
- the overseer should take into account the potential impact on the market; for instance what would be the impact in cases where the infrastructure is (owned by) a publicly quoted entity;

- the disclosure must be arranged in consultation with the system⁽¹⁾. This is important for maintaining a constructive relationship with the system (as well as for avoiding litigation risks). Disclosing sensitive information on a system without its consent might undermine its future willingness to cooperate with the overseer.

Given those prerequisites, any disclosure of the assessment results should be made in rather broad and general terms. It is on this basis that the Eurosystem has taken the decision to disclose the ELLIPS and CEC assessments. Similarly the NBB decided to make public the oversight assessment for the following systems it oversees⁽²⁾:

- assessment of ELLIPS (Belgian RTGS) against the Core Principles (disclosure on the ECB’s and the NBB’s websites);
- assessment of CEC (retail ACH) against the 6 Core Principles for Retail Payments Systems (disclosure on the ECB’s and the NBB’s websites);
- assessments of the Euroclear (ICSD) system and the NBB SSS against the CPSS-IOSCO Recommendations (respectively the NBB’s FSR and the NBB’s website).

In disclosing those assessment results, the NBB intended to promote its accountability as overseer, although it should be understood that oversight goes beyond this general framework. Disclosing the outcome of its assessment should increase the transparency of the NBB’s role for the participants of the system. The assessment of Euroclear against the CPSS-IOSCO Recommendations has been disclosed in accordance with the CPSS-IOSCO methodology which promotes the publication of the results of the assessment but also with due consideration of the international dimension of the Euroclear system. As this makes it impractical to set up cooperative arrangements with all the interested central banks for the ICSD activities, a valid alternative is to disclose the results of the assessment.

2. Outstanding issues

There are a few outstanding issues relating to the disclosure of conclusions of assessments, which would need further attention and discussion by central banks:

- what about “bad” results? If weaknesses are identified in the system, disclosure might, in some cases, destabilise the system by exacerbating the problem. (For instance it would not be wise to disclose a weakness in the cyber defence of a system, or a BCP weakness.);

(1) As mentioned, disclosure in emergency situations is beyond the scope of this article.

(2) See also table 1 in the introduction of this part of the FSR: “Overall framework: General oversight principles”.

- liability: when disclosing the assessment results, the central banks should avoid creating the impression of giving a seal of approval to a system, or becoming liable for potential future problems within the system.
- frequency: how frequently should such a disclosure take place? Once the results have been disclosed, how should a central bank act when its assessment changes? It may not always be practical to provide frequent updates, but the central bank must then be aware that the market/users are basing their assessment of the system on outdated information.
- level of detail: how far should the details of the assessments be disclosed? Is it preferable to stick to overall conclusions without revealing much detail?
- level playing field: what about competing infrastructures with different authorities responsible for their oversight? If the assessment results are only disclosed for one (or some) of various competing systems, this may not necessarily increase transparency, and may have a distorting impact on users' interactions with these systems (as they could be inclined to stop using systems for which authorities have disclosed certain shortcomings).
- target audience: to whom should the disclosure be directed: the public in general, the financial sector, or the system's users? Can disclosure serve the purpose of informing other regulatory authorities? Should the disclosure be adjusted according to the audience?
- self assessment by the system: how to react when the system discloses its self assessment? Should the overseer check/react/approve before disclosure? What if the overseer has a different opinion on some of the scorings?

There are important differences in the legal framework within which central banks execute their oversight, as well as in the competitive environment of the various payment and settlement systems. As a consequence, it is difficult to provide unique, unambiguous and generally valid answers to the outstanding issues listed above, and a central bank should remain cautious when deciding upon its policy on the disclosure of assessment results. A central bank might also have to differentiate between the systems it oversees, and disclose results for only some of these systems.

Further issues could arise in the case of international cooperative arrangements, notably when cooperating central banks do not agree on whether there should be disclosure of results, or on the assessment conclusions themselves. Such dissent could be caused by failure to agree on a relevant set of standards, or on the assessment method. If one of the cooperating central banks discloses assessment results with which others disagree, the disagreement between central banks may become very visible for the system, reducing the incentives for the system to collaborate under the cooperative arrangement. Alternatively, if only one, not necessarily shared assessment is made public, this could be detrimental to the transparency and accountability of the oversight of the system.

In such a situation, further complications may arise if bank supervisors participate in the cooperative arrangement. Bank supervisors often operate under strict legal regimes of confidentiality and professional secrecy and, as a rule, do not disclose the results of their assessments.

Disclosing assessment results based on information obtained from a bank supervisor under a cooperative arrangement, without the agreement of the supervisor, may thus create legal problems for the bank supervisor, and may limit his willingness to participate fully in the cooperative arrangement.

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Measuring liquidity risk in systems providing payment and settlement services: statistical approaches for overseers⁽¹⁾

Introduction

Payment and settlement services play a crucial role in the proper functioning of the global financial system as they support the transfer of cash and financial assets between financial intermediaries. A malfunctioning of such market infrastructures may create widespread contagion effects on financial markets and institutions. Central bankers, guardians of macroeconomic financial stability, need to ascertain that these infrastructures do not stop functioning in times of market stress.

Stress tests are used to measure the consequences of “what if” questions, like “what if a worst case scenario materialises”. So instead of the traditional risk measurement approaches which take an average of the consequences over different scenarios weighted by the probability of occurrence of each of the scenarios, stress tests measure the consequences of a single exceptional and unlikely, but nevertheless plausible scenario.

One such scenario is that where a large participant of an infrastructure fails. This scenario is inspired by the standards issued by central banks with respect to Systemically Important Payment Systems in which multilateral netting takes place, and to Securities Settlement Systems. The rationale behind these requirements is that the systems should be able of ensuring timely settlement in the event that the participant with the largest payment obligation is unable to pay. The underlying cause of the inability to meet its payment obligation is not the focus of this article. The probability of such an event materialising is

admittedly tiny, but if it does, it might have a systemic impact because market activity would be disrupted. As a result, payment and settlement systems should at any time be able to cope with the exposure of the participant with the largest payment obligation.

But how should this be measured? Is it sufficient to refer ex post to historical data or should the measurement be more forward looking through the use of stresstests? The aim of this article is to discuss different methodologies for measuring the liquidity risk run by a payment or settlement system in normal and stressful times. We focus attention on the system’s resilience to withstand the liquidity shock arising from the failure of the participant with the largest payment obligation. While such a historical approach already takes into account extreme circumstances (i.e. where the participant with the largest exposure defaults), we illustrate that one might consider to supplement it by alternative methods to measure potential risk during periods of market stress.

The remainder of the article is structured as follows. Section 2 explains a simple historical measure for liquidity risk. We use realistic data that have been generated for the purpose of illustrating the potential added value of a forward looking stress test approach. Section 3 discusses possible alternative methodologies for measuring liquidity risk in case the participant with the largest payment obligation defaults. We illustrate how different assumptions

(1) The main authors of this article are Johan Devriese and Stan Maes.

affect the measure of liquidity risk. Section 4 enumerates some more general elements to be taken into consideration and Section 5 concludes.

1. Defining a measure of liquidity risk

Any system extending credit to facilitate settlement faces the risk that payments due are not received as expected. When these credits are concentrated with a few clients, non-timely reimbursement may pose severe constraints on the amount of available liquidity and hence on the settlement efficiency of the system.

1.1 Definition of net liquidity position, shortfall events, and shortfall ratio

For the purposes of this article, we define the Net Liquidity Position (NLP) of the system operator as the difference between the liquidity it has available and its largest exposure. In practice, the participant representing the largest exposure may change from day to day. Instances where the NLP is negative, i.e. times where largest exposure exceeds the available system liquidity, are referred to as shortfall events. The estimated probability of occurrence of a shortfall is called the shortfall ratio. The coverage ratio is the logical counterpart of the shortfall ratio and is defined as one minus the shortfall ratio.

Note that a so-called shortfall event is potentially misleading, as the largest exposure participant needs not default when the NLP is negative (the shortfall may be virtual). However, when the participant should be unable to meet its payment obligations exactly when a shortfall event occurs, a serious problem arises. Depending on the reason underlining the participant's failure to pay, the liquidity risk could materialise during a period of one or more days. If the participant does default, the system will be exposed in the end to a credit risk, the resolution of which will depend on the risk mitigation measures in place (collateralisation of the credit positions, etc.).

1.2 Historical approach

A simple approach to estimate the shortfall ratio goes as follows:

1. Collect daily figures on the largest exposure of a single participant over a specific time window.
2. Collect data on available liquidity on a daily basis over the same time window.

3. Calculate $(2) - (1)$, i.e. the NLP. The system is said to experience a "shortfall event" on that specific day, when NLP is negative.
4. Report the percentage of days in the time window that shortfall events are recorded. This percentage is referred to as the shortfall ratio.

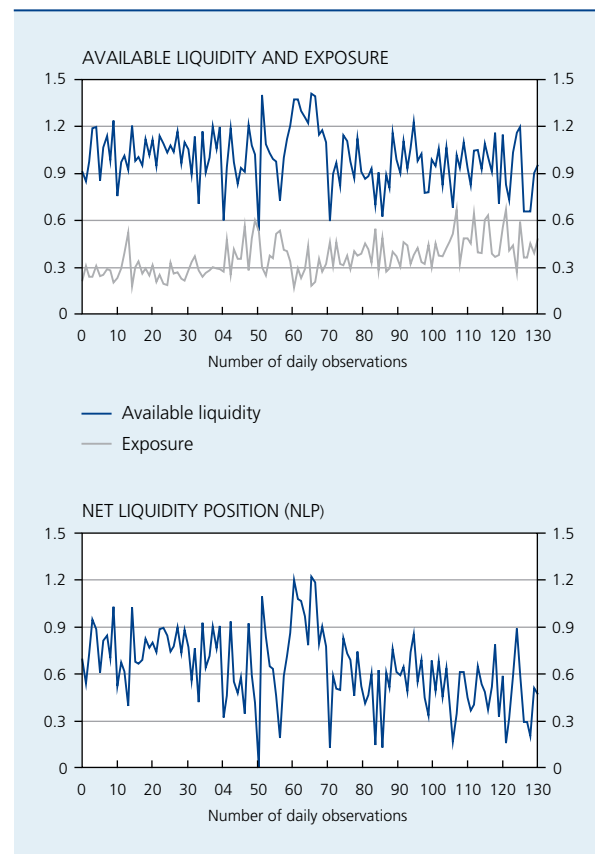
In the remainder of this article, we will refer to this approach as the historical approach.

1.3 Basic data set

In this article we have made use of data that have been generated in such a way as to present some key statistical properties – such as fat tails, seasonality, or correlations which are typically observed in financial markets and the infrastructures that support them.

In our analysis we only concentrate on the first day impact of the stress event, assuming that the liquidity risk only materialises for one business day and that all normal liquidity sources are available to the system.

CHART 1 BASIC DATA SET ON AVAILABLE LIQUIDITY, LARGEST EXPOSURE AND NLP



It is important to stress the fact that the available liquidity and largest exposure data refer to the situation at the end of the day. Hence, they incorporate the management actions that have been taken in anticipation of expected sources and uses of funds. This approach to the management of liquidity risk is of course of utmost importance.

Chart 1 plots our data with the upper panel displaying the available liquidity and exposure and the lower one showing the resulting NLP. Table 1 displays corresponding summary statistics. In our example, the NLP is on average equal to 0.64 with a 0.24 standard deviation and fluctuates between a low of 0.01 and a high of 1.22. We have also assumed there was no day over the sample period with a shortfall event. Put differently, this means a 0 p.c. shortfall ratio. This zero shortfall ratio is interpreted as a benchmark result for the remainder of this article. Note that Chart 1 reveals there was at least one day with a “near” shortfall (see also minimum NLP in Table 1).

It is possible to use a statistical test developed by Jarque and Bera (1980) to test the hypothesis that the exposure, the available liquidity, and/or the NLP data series are normally distributed. This test reveals that the hypothesis of a normal distribution is rejected for the exposure data (p-value of 1 p.c.). This is not the case for available liquidity and NLP, for which we cannot reject the null hypothesis of normality. Finally, the correlation between largest exposure and available liquidity is not reported in the table, but amounts to -0.32 . The negative correlation is intuitive. In periods of ample market liquidity, available liquidity for the system is high and exposures to participants might be low. In periods of tighter market conditions, available

liquidity may go down and exposure might be covered in a less timely manner.

2. Alternative liquidity risk measurement approaches

2.1 Shortcomings of a historical shortfall ratio measure

The historical shortfall ratio measures the liquidity risk observed ex post. It is a good indicator to evaluate the conditions which have been prevailing in the past. The ratio is easy to understand and calculate. This is an important advantage if one wants a measure that can be used throughout the organisation. The oversight standards would then not be fulfilled whenever the shortfall ratio is non-zero, i.e. when one or more shortfall events are observed. While a historical approach already takes into account extreme circumstances one needs to be sure that a liquidity risk measure is also representative for liquidity risk in potentially stressed future times. In this Section, we illustrate that statistical properties like fat tails and seasonality may bias a historical liquidity risk measure towards underestimation of the true liquidity risk.

First, a pure historical shortfall ratio measure is non-probabilistic and therefore neglects how far off the NLP is from zero. No assumptions are imposed about the kind of distribution that has generated the NLP data. We know already that the hypothesis that the NLP data are generated by a normal assumption cannot be rejected, therefore imposing normality on the NLP distribution and reporting the implied cumulative probability for the zero NLP should give us an implied shortfall ratio estimate that is fairly close, but not identical, to the historically observed ratio. However, one might take into account that the underlying distribution might have fatter tails than the normal or historical distribution, and that we have just been lucky to have observed zero shortfall events⁽¹⁾. A stress environment may also imply that a fat-tailed data generating distribution is more appropriate. Imposing a distribution with fatter tails (like the Student-t) and computing the inferred shortfall ratio teaches us to what extent the assumption about the underlying distribution affects the benchmark shortfall ratio estimates.

TABLE 1 SUMMARY STATISTICS OF NET LIQUIDITY POSITION, AVAILABLE SSS LIQUIDITY, AND LARGEST EXPOSURE

	Available liquidity	NLP	Exposure
Average	1.00	0.64	0.36
Standard deviation . .	0.18	0.24	0.11
Maximum	1.41	1.22	0.67
Minimum	0.54	0.01	0.17
Skewness	-0.19	-0.06	0.69
Kurtosis	3.02	2.95	3.02
Shortfall	n.	0.00	n.
Jbtest (p-value)	0.69	0.96	0.01

Note: Skewness and kurtosis of the normal distribution are zero (symmetric distribution) and three, respectively. Jbtest refers to Jarque and Bera (1980).

(1) The fact that we cannot reject a null hypothesis statistically does not imply that we should accept the null hypothesis. The inability to reject may be related to the lack of power of the statistical test, implying that the data do not allow us to clearly discriminate between different null hypotheses.

A second element that one could take into account relates to the treatment of the volatility of the NLP. A simple historical shortfall ratio measure ignores NLP volatility and looks at the level only. In our example, illustrated in Chart 1, it is clear that the volatility of the NLP is not constant, but varies over time. The volatility of the data shows clustering behaviour, i.e. there are periods of high volatility (e.g. observation 40-70) and periods of low volatility (e.g. observation 20-40). Ideally, our assessment of tomorrow's liquidity risk would take into account whether or not we are today in stable or volatile conditions (a conditional shortfall ratio). Inference from average historical figures over a given fixed time span may thus be inappropriate, as the volatility of the NLP may increase when markets go awry.

A third element to be evaluated is the (time-varying) correlation between the components underlying the NLP, namely available liquidity and largest exposure. Indeed, analysis of the historical NLP dynamics implicitly assumes that the underlying observed correlation between available liquidity and largest exposure carries over to the future. The sample correlation observed in our example amounts to -0.32 . Though, correlations need not be constant through time. In an extreme situation, correlation may tend towards minus unity in times of stress, i.e. stressful market conditions may lead to low available liquidity for the system combined with less timely coverage of exposure. Together with the idea that correlations may change in times of stress, it may be worthwhile to investigate to what extent treating the correlation between available liquidity and largest exposure as a model parameter affects the reported benchmark liquidity risk measures.

In short, a historical shortfall ratio is an important and useful benchmark measure, but system overseers may want to take the above shortcomings into account. We will assess the impact on the shortfall ratio estimate (i) when we allow for alternative, more fat-tailed data generating distributions for the NLP (Section 3.2), (ii) when we allow for time-varying volatility of the NLP (Section 3.3), and (iii) when we model the components of the NLP separately and allow the correlation between the two components to be different from the historically observed one (Section 3.4). In each of these illustrations, we compare the results with the historical zero benchmark shortfall estimate.

2.2 Allowing alternative data generating distributions for the NLP

In the historical approach, it is implicitly assumed that the future behaviour of the NLP is similar to the average behaviour in the sample period. This is not a problem when both historical and forecast liquidity risk measures cover normal times. However, it is useful to measure liquidity risk in times of stress, even when the historical approach already takes extreme circumstances into account (by assuming that the participant with the largest exposure fails to meet its payment obligation). In such a case, it may be important to control for the distribution of the time series and/or its driving parameters. This is possible in a parametric method. In this method, a specific distribution is assumed (e.g. Normal, Student-t, etc.), while setting the characterising population moments (e.g. mean, variance, etc.) equals to the observed sample moments.

Altering the data generating distribution of the NLP is relevant for our analysis, as stress tests try to study the impact of highly unlikely events which are, per definition, "tail events", i.e. events that are situated in the tails of the distribution. The Student-t distribution is known to have fatter tails than the normal distribution, see Chart 2 for a visual illustration where mean and variance are set at the sample mean and variance. Given that we cannot reject the hypothesis of normality for the NLP distribution, imposing a more fat-tailed distribution on the data implies that we are assuming that we have been lucky to have observed no shortfall event in the historical data set. Using a distribution with fatter tails may also be useful

CHART 2 COMPARISON OF NORMAL AGAINST MORE FAT-TAILED STUDENT-T DISTRIBUTION

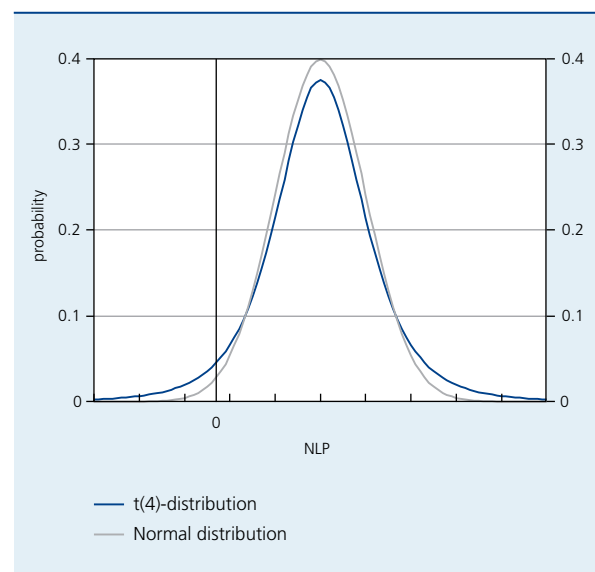


TABLE 2 COMPARISON OF SHORTFALL RATIO ESTIMATES
BASED ON ALTERNATIVE UNDERLYING DATA
GENERATING DISTRIBUTIONS, WHILE RETAINING
IDENTICAL FIRST TWO MOMENTS

NLP distribution	Shortfall ratio			
	Historical (130 obs.)	Normal	Student- t(6)	Student- t(4)
Shortfall ratio	0.00	0.37 (0.5)	2.44 (3.0)	2.88 (4.0)

Note: In brackets underneath the shortfall ratio in percentage points is a measure of the amount of shortfall events expected to occur in a 130-day period.

when we are willing to accept that extreme events are more likely in case of stress.

Given the mean and standard deviation of the NLP, obtained from the historical data, and imposing a specific distribution such as the Normal or Student-t distribution, we can infer the implied shortfall ratio, as this is just the probability that the NLP becomes negative (the surface under the distribution line to the left of the zero point in Chart 2).

Table 2 compares the historical benchmark shortfall ratio estimates with those that are inferred from imposing a Normal distribution, a more fat-tailed Student-t distribution (with 6 degrees of freedom), and an even more fat-tailed Student-t distribution (with 4 degrees of freedom). The idea that the NLP may not be normally distributed can be supported by the fact that variables underlying the NLP may be non-normal (see JB-test of exposure in normality Table 1).

For example, as the NLP has been 0.64 on average with a standard deviation of 0.24, a negative NLP is expected to occur with a 0.37 p.c. probability. As expected, given that we cannot reject the null hypothesis of normality at conventional levels of statistical significance, the shortfall ratio estimate implied by a normally distributed NLP is fairly close to the historical zero shortfall ratio. Nevertheless, it is shown that the absence of any shortfall reported on a historical basis does not mean that no shortfall should be expected in the future.

If we allow for a distribution with fatter tails (see last two columns), results change significantly: a negative NLP is now expected to occur with a 2.44 p.c. probability when a Student-t distribution with 6 degrees of freedom is assumed (\approx a 6-fold increase compared to the estimate implied by a Normal distribution), or with a 2.88 p.c.

probability when a Student-t distribution with 4 degrees of freedom is assumed (\approx a 7-fold increase).

2.3 Allowing for a time-varying NLP volatility

What if we retain the assumption of normality, but instead focus on time-variation in NLP volatility? As illustrated by Chart 1, the NLP data could be more volatile in some time periods than in others. Moreover, these risky times are often not scattered randomly across time. This degree of autocorrelation in the riskiness of the NLP is referred to as “volatility clustering”.

Time-varying volatility might become a particular concern when we assess liquidity risk in the near future (next few days, week, etc.), depending on the type of correlation between available liquidity and exposure. Suppose there are periods of continuing low volatility followed by periods of continuing high volatility. And suppose, we are entering a period of high volatility. What is the risk of encountering a liquidity shortfall in the near future? Over the historical period, volatility may have been just average or even low. The benchmark measure will then conceal the true liquidity risk for the overseer.

A possible solution to this problem is to model the time-varying volatility of the NLP. Contrary to the historical and above parametric method, it is now not taken for granted that each observation comes from the same distribution, independently from the value observed in the previous period(s). The econometric challenge is to specify how the time varying standard deviation (variance) of the NLP can be specified, on the basis of past information.

The simplest approach would be to use the rolling standard deviation of NLPs. This is the standard deviation calculated using a fixed number of the most recent NLP observations. For example, we could compute the standard deviation of the NLP every day using the most recent month of data (25 working days, say). This is shown in Chart 3.

Of course, the assumption of equal weights is unattractive. Instead, more recent observations may require a higher weight. Furthermore, the zero weight assumption for days further in the past than 25 days is also unappealing. Finally, it seems to be logically inconsistent to use volatility measures that are based on the assumption of constant volatility over some period (1 month) when the resulting series moves through time. A model that takes volatility clustering into account is the well-known GARCH or Generalized AutoRegressive Conditional Heteroskedasticity model (Engle (2001)). It is often and successfully used in finance. The GARCH model allows the

data to determine the best weights to use in forecasting the variance. Some background to this type of model is explained in Box 1.

Using the estimated parameters from the GARCH model, the conditional standard deviation (variance) can be calculated. The conditional standard deviation is the expected standard deviation for period t , given that all the

information up to period $t-1$ is known. Chart 4 displays the results for our example (compare also with Chart 3). Clearly, there are periods where the standard deviation and hence the volatility of the NLP is high, and periods where it is low. From Table 1 we know that the average standard deviation over the full historical time window is 0.24. Here we observe that the conditional standard deviation hovers between 0.21 and 0.33.

Box 1 – The GARCH (1,1) model

A GARCH model typically consists of a mean and variance equation, as in equations (1) and (3) below. Specifically, in this simple model, the NLP is regressed on a constant, where the error term has a volatility/variance that depends on its 1-period lagged value.

The GARCH (1,1) model is specified as follows:

$$NLP_t = s + \varepsilon_t \quad (1)$$

$$\varepsilon_t \in N(0, \sigma_t^2) \quad (2)$$

$$\sigma_t^2 = w + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 \quad (3)$$

The conditional mean (eq. (1)) of the time series, NLP_t , consists of a simple constant, plus an uncorrelated, white noise disturbance, ε_t . Equation (3) teaches us that the best predictor of the variance in the next period (σ_t^2) is a weighted average of three components: (i) the long-run average variance w , (ii) the variance predicted yesterday for this period (σ_{t-1}^2), and (iii) the new information in this period that is captured by the most recent squared residual (ε_{t-1}^2). Such an updating rule is a simple description of adaptive or learning behaviour. α measures the extent to which a volatility shock today feeds through into next period's volatility, while β measures the rate at which this effect dies out over time.

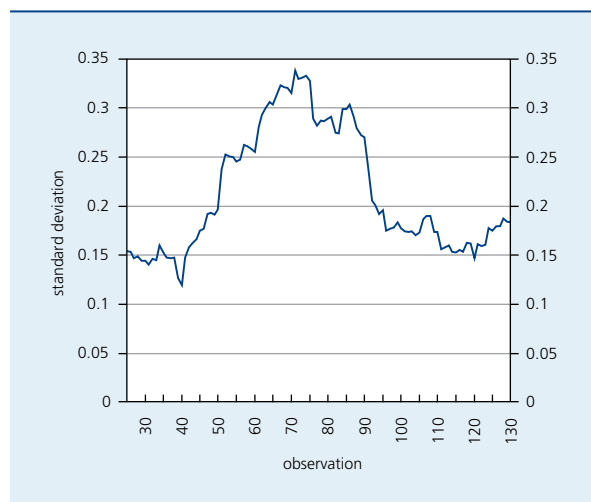
We get the following estimates for equation (3) when applied to the data:

ESTIMATES FOR THE CONDITIONAL VARIANCE EQUATION
(GARCH(1,1))

	Coefficient	Std. Error	t-Statistic
w	0.6296	0.0226	27.8845
ε_{t-1}^2	0.0849	0.1090	0.7788
σ_{t-1}^2	0.7568	0.3339	2.2668

The estimate for β is 0.76 and statistically significant, which implies that the movements of the conditional variance away from its long-run mean lasts a fairly long time. The autocorrelations for the squared GARCH (1,1) residuals now look a lot smaller and less systematically positive (not reported).

CHART 3 ROLLING-WINDOW STANDARD DEVIATION OF THE NLP



Given the time-variation in GARCH (1,1)-implied standard deviation, the implied shortfall ratio conditional on time t information will vary across time as well. For any given point in time we can now predict the in-sample shortfall ratio estimate for the next period (ideally we would generate out-of-sample forecasts). This is done by calculating the shortfall probability (left tail) for a normal distribution with, as mean, the average NLP and, as standard deviation, the conditional standard deviation calculated at that point in time. It turns out that the resulting GARCH (1,1) conditional shortfall ratio varies between 0.11 p.c. and 2.67 p.c., depending upon the data point where we perform the estimation. This range should again be compared with the benchmark shortfall ratios reported in

CHART 4 CONDITIONAL STANDARD DEVIATION USING A GARCH(1,1) MODEL

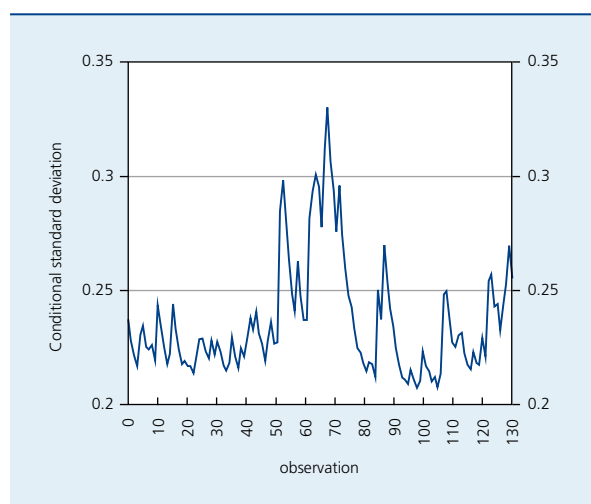


Table 2. The example also underlines the strength of this methodology as an early warning signal. While the historical and parametric model only shows a slow adjustment when volatility increases, this GARCH model allows for a swifter reaction⁽¹⁾.

If we also explicitly take into account time-variation in expected NLP – instead of assuming a constant expected NLP – this range can be shown to be even wider, because of the presence of observations with relatively low NLP levels and relatively high conditional volatilities (results available on request).

2.4 Allowing for a different correlation between available liquidity and largest exposure

What if we retain the assumption of constant volatility and normality but control for the correlation of the variables underlying the NLP? Specifically, what can we learn from analysing the joint behaviour of largest exposure and available liquidity?

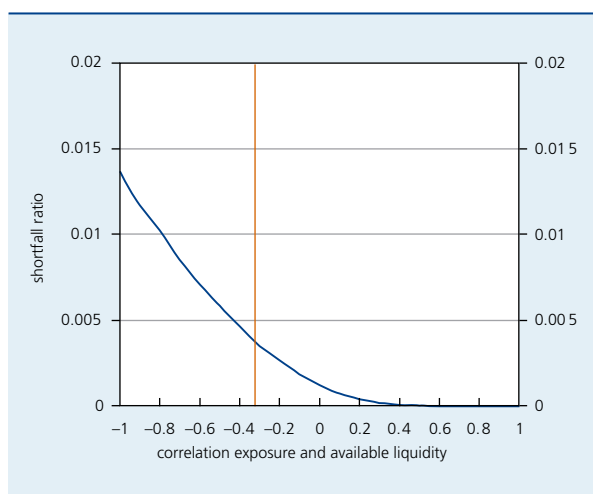
For convenience, we assume that available liquidity and largest exposure show a joint normal multivariate distribution. As the difference between two normals is again normal, assuming joint normality on available liquidity and largest exposure implies normality of the NLP.

The major advantage of analysing the component dynamics jointly is that we can control for their correlation. Above, when we used the NLP data, we were implicitly fixing the correlation to its historically observed value of -0.32 . In the following illustration, we will analyse the effect of changing the correlation across the two time series on the estimated shortfall risk, *ceteris paribus*. If the correlation between available liquidity and largest exposure is set high, high exposures go together with high available liquidity, and vice versa. We perform a Monte Carlo simulation experiment and randomly draw 10,000 130-day observation-pairs of available liquidity and exposure from the joint normal distribution for given values of the correlation coefficient. We compute the percentage of shortfall events observed for each of the 10,000 draws of 130-day periods, the average of which gives us a point estimate for the shortfall ratio as a function of the assumed correlation between exposure and available liquidity. Chart 2 presents the simulation results for varying levels of the correlation coefficient.

⁽¹⁾ Note that we are only considering the effect of the time-varying volatility here and keep the correlation between available liquidity and largest exposure equal to its historical value (see below). It can be expected that the use of a multivariate GARCH model for both available liquidity and largest exposure together with a correlation assumption that tends towards minus unity would result in even larger shortfall ratio estimates.

CHART 5

ESTIMATED SHORTFALL RATIOS, AS A FUNCTION OF THE CORRELATION BETWEEN AVAILABLE LIQUIDITY AND LARGEST EXPOSURE (ASSUMING JOINT NORMAL DISTRIBUTION)



When we look up at the shortfall according to the historical correlation estimates (-0.32) in Chart 5, we find a shortfall ratio of about 0.40 p.c., which is close to the shortfall ratio from the normal distribution in Table 2. Again, this result is not really surprising, as we were unable to statistically refute that the data were normally distributed (which is the underlying driver of the results in Chart 5).

The approach used allows us to assess the impact of a change in the correlation between available liquidity and the largest exposure, where we maintain the joint normality assumption. We can see that shortfall ratios become negligible once the correlation exceeds 0.4, but that they become quite significant for correlations approaching minus unity. Specifically, the shortfall may become as high as 1.4 p.c. when exposures and liquidity become perfectly negatively correlated.

Given that correlations are notoriously difficult to estimate with accuracy, and given that correlations do change in stressful circumstances, this result is potentially important to keep in mind when assessing the outcome of a simulation for given correlation coefficients. In the historical approach it is implicitly assumed that both variables have a constant correlation, equal to the historically observed one. However, in times of stress, a low level of available liquidity may be combined with a less timely coverage of exposure, as liquidity in the market is scarce. This would mean that the correlation would tend towards minus unity in stressful circumstances.

3. Additional considerations

On top of the above described elements, one may also consider the following issues, which may inspire future research.

First, the shortfall ratio is a measure that relies on so-called shortfall events, i.e. events of a 0/1- nature, signalling that the largest exposure exceeds available liquidity. However, one could argue that a more continuous measure of liquidity risk is desirable, as it would take into account how far off we are from the zero NLP threshold. For example, looking back at the lower panel of Chart 1, we observe a near zero NLP at a number of days, which does not affect the measured historical liquidity risk at all. This point is already partially addressed by looking at more statistical measures as discussed above.

Second, only the exposure to the participant with the single largest exposure is assumed, without any analysis of the second largest, or of how the system of exposures moves together. Although the likelihood of an unrelated failure of several big counterparties is low, it may well be that the failure of a big player in the market triggers the failure of other participants.

Third, a more refined analysis based on the time series of the different components of available liquidity would allow a richer analysis. This is beyond the scope of this article, but may be worth investigating in future research.

Fourth, most statistical distributions have infinite tails. This means that in theory – although with a very low probability – the NLP can be minus infinity. This is counter-intuitive. In practice, shortfalls are limited because payments obligations and hence the largest exposures are typically capped and available liquidity can never become negative. This implies that it may be better to use distributions that have capped tails as well, for example, Beta, F or χ^2 distributions. Other distributions will tend to overshoot the true risk. However, using capped tail distributions necessitates the calculation of the cut-off value. A dataset containing the theoretical maximum exposure and minimum liquidity available would be needed.

Fifth, the choice of the particular time window will be important and always involves a trade-off. If the window is too long, reality may have changed in the meantime, making it irrelevant and unreliable. If the chosen window is too short, there may be too few data points to allow reliable statistical inference. To illustrate this, the Monte Carlo implied 95 p.c. confidence intervals around the shortfall ratio point estimates in Chart 5 are relatively large for our 130-day shortfall ratio estimates: [0 p.c., 1.5 p.c.]

for the historical correlation shortfall ratio estimate and [0 p.c., 3 p.c.] for the minus unity correlation 1.4 p.c. point estimate. These confidence intervals become narrower when larger time series are used in our simulation exercise. As is also argued in the section on time-varying volatility, it seems best to use a longer time series and to let the data decide on the appropriate weights. Using a longer time period will allow a more precise estimate of sample mean shortfall ratios.

Finally, if we switch to a statistical approach, there will always be a non-zero shortfall ratio estimate, even when a shortfall event did not occur in the sample. The question then concerns the shortfall ratio estimate threshold at which it is appropriate for overseeing authorities to become concerned. While we cannot offer precise guidelines on this issue, it seems best, given the complexity of stress testing, to pay most attention to relative changes in point estimates, rather than to the level of point estimates.

Conclusions

This article proposes statistical measures to measure the liquidity risk in systems providing payment and settlement services. Specifically, the aim is to define a simple yet informative measure of liquidity risk and to discuss its potential weaknesses. On the basis of the standards, we propose to estimate the shortfall ratio, being the probability that the largest exposure in the system exceeds the available liquidity, resulting in a (virtual) negative net

liquidity position. The actual failure of the largest exposure could have serious consequences, given the importance of the proper functioning of payment and settlement systems for the economy.

While a historical estimate of the shortfall ratio is a useful benchmark, we propose to evaluate additional tests to estimate liquidity risk in stressful circumstances. These approaches introduce fat tails, time-varying volatility of the net liquidity position, and correlation estimates between available liquidity and largest exposure that differ from historical estimates. We find that the liquidity risk measure employed, the shortfall ratio, may be quite sensitive to these considerations and may increase to a multiple of its historically estimated value. We also find that some measures of liquidity risk react more swiftly to changes in the market environment than others.

Our results caution against an excessive reliance on a measure of liquidity risk that is insensitive to the data generating distribution, time-varying volatility and correlation. We believe that there is scope to develop a toolbox of alternative off-site oversight measures of liquidity risk. Likewise, more extreme situations of market stress can be simulated, for example by reporting the shortfall ratio in the event of a run on deposits or in cases where cash correspondents are not available.

While statistical considerations might supplement a historical approach to further measure the liquidity risk in stressed situations, business sense should nevertheless prevail when applying these methods.

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Cross-border securities settlement and risk analysis framework for cross-border links⁽¹⁾

Introduction

The launch of the single currency in Europe has boosted cross-border activity in securities trading and settlement. Although consolidation and harmonisation processes are currently ongoing, the European settlement infrastructure is, at least technically, still based on national platforms⁽²⁾. As direct remote access⁽³⁾ of foreign participants to local securities settlement and payment systems to execute cross-border settlement is not always possible or practicable, investors often have to connect with third parties or intermediaries. The latter may, in their turn, have to connect to other intermediaries to hold or settle foreign securities. Those intermediaries can be local agents or global custodians, as well as Central Securities Depositories or International Central Securities Depositories (i.e. (I)CSDs). The use of intermediaries in cross-border securities transactions can make the settlement process more complex, creating other risks than those related to securities transactions settled in a purely domestic environment.

In section 1, the role of links between (I)CSDs in cross-border settlement is reviewed as a possible channel to execute cross-border trades. The functioning of links will be discussed, as well as the difference between cross-system settlement and internal cross-border settlement. Section 2 will focus on the risks in cross-border

links from the perspective of an (I)CSD that links up with another (I)CSD. Finally, Section 3 refers to the CPSS-IOSCO Recommendations for Securities Settlement Systems (2001) relating to cross-border settlement through links for which implementation the NBB, as overseer of securities settlement systems in Belgium, has developed a specific Risk Analysis Framework. This Framework is detailed in annex 1 to this article.

1. Role of links in cross-border settlement

1.1 Possible channels for cross-border settlement

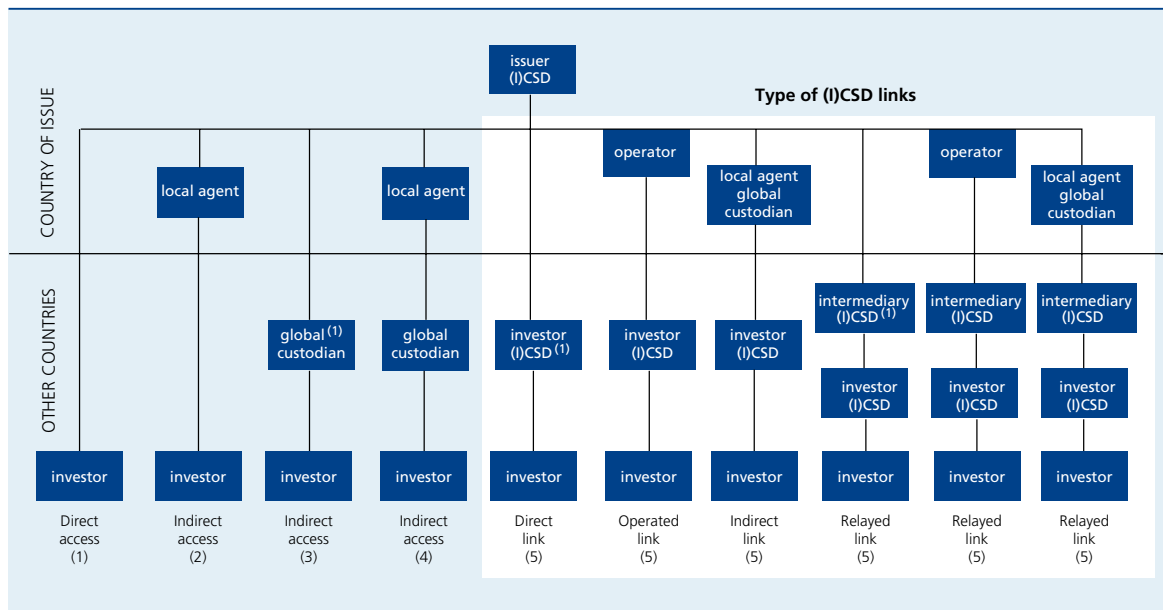
Cross-border settlement is defined (BIS, 1995) as “the settlement of a security in a country other than the country in which one or both counterparties are located”. In general, settlement takes place in the CSD of the country where the security is issued. Investors that would like to buy or sell foreign securities might access the foreign CSD directly. The cost of direct membership is often high and it may not always be practicable for foreign investors to process transactions without a local presence, due to particular market rules or to the diversity of back-office systems. In some markets, direct access to local CSDs may only be allowed to locally licensed firms. Moreover, investors may not have direct access to local central bank accounts or credit, which is needed to settle securities transactions in the local market. The Giovannini Group (2001, 2003) recognised that impediments of a legal or technical nature to remote access to national settlement systems represent an important barrier to the

(1) The main author of this article is Kris Bollen.

(2) In the mergers between securities settlement infrastructures which have taken place in Europe, either in domestic markets (e.g. IBERCLEAR in Spain) or in a cross-border context (e.g. Euroclear Group, Nordic CSD), technical platforms still remain separate.

(3) Direct remote access is defined (Giovannini, 2001) as the ability to participate in or use the facilities of a system located in another country, without the need to have a legal presence in that country.

Box 1 – How to execute cross-border settlement?



(1) The global custodian, investor (I)CSD or intermediary (I)CSD could also be located in the country of issue.

An investor is to be defined as a counterparty that intends to settle foreign securities transfers (i.e. to execute buy or sell transactions) with domestic or foreign counterparties. An investor can have direct remote access **(1)** to the (I)CSD where the security is issued (i.e. the issuer (I)CSD). Apart from direct remote access, an investor can use intermediaries (i.e. local agents, global custodians, (I)CSDs) to execute cross-border settlement. The intermediary will, if allowed by relevant laws and regulations, open a securities omnibus account with the issuer (I)CSD to hold securities on behalf of its clients. An omnibus account is an account on which the securities held by a participant on behalf of all (or at least several) of its customers are kept.

An investor can use as intermediary its own local agent located in the foreign market to hold securities **(2)** or it may centralise its holdings via a global custodian **(3)**, that may have its own network of local agents to access the issuer (I)CSD **(4)**. Alternatively, investors could make use of an (I)CSD (i.e. investor (I)CSD) that has established a link to hold and settle foreign securities in the issuer (I)CSD. Investor (I)CSDs may set up different types of market links **(5-10)**.

The investor (I)CSD can establish a direct link with the issuer (I)CSD by opening an omnibus account directly with the latter and by operating the omnibus account by itself **(5)**. In the case of an operated link, a third party, typically a custodian bank, will operate the account in the issuer (I)CSD on behalf of the investor (I)CSD **(6)**. For operated links, the responsibility for the obligations and liabilities in connection with the registration, transfer and the custody of securities remain legally enforceable between the investor (I)CSD and the issuer (I)CSD.

Instead of opening an omnibus account with the issuer (I)CSD, the investor (I)CSD could make use of its own network of intermediaries, such as local agents or global custodians, to address the issuer (I)CSD indirectly **(7)**. In the case of such an indirect link, the investor (I)CSD and issuer (I)CSD do not have any direct contractual or technical arrangement. An omnibus account will be used by the local agent or global custodian on behalf of the investor (I)CSD in the books of the issuer (I)CSD.



Apart from local agents or global custodians, an investor (I)CSD may also rely on another third (I)CSD acting as intermediary to link up with an issuer (I)CSD. A relayed link is a contractual and technical arrangement allowing the investor (I)CSD and the issuer (I)CSD, that are not directly connected to each other, to settle securities transactions through an intermediary (I)CSD. In turn, this intermediary (I)CSD may have opened a direct **(8)**, operated **(9)** or indirect link through a local agent or global custodian **(10)** with the issuer (I)CSD in the local market.

Sources: BIS (1995), Cross-Border Securities Settlement and NBB

achievement of a level playing field in cross-border settlement in the EU.

When direct remote access is not practicable or possible, investors might rely on third parties or intermediaries to hold and settle foreign securities. Box 1 illustrates the various possible channels for executing cross-border settlement. It is shown that, apart from direct remote access, intermediaries used in cross-border settlement can be either local agents, global custodians, (I)CSDs or a combination thereof. If (I)CSDs are used, links are set up with the (I)CSD where the foreign security is issued. As CPSS-IOSCO Recommendation 19 only covers links between (I)CSDs, the scope of this article is limited to the functioning and risks of cross-border settlement through (I)CSD links (see (5)-(10) in Box 1). Other intermediary channels for the execution of cross-border settlement will not be covered, notwithstanding some similarities with the functioning of (I)CSD links (see (2)-(4) in Box 1). It might be worthwhile to explore to what extent the Risk Analysis Framework presented below could also be applied to other channels of cross-border settlement.

The traditional criterion used to define a cross-border settlement is the location of the investor and its counterparty⁽¹⁾. However, this article does not focus on the risks for the investor, but on the risks at the level of the investor (I)CSD that has established a link with an issuer (I)CSD. The cross-border criterion will be considered here at the level of the security (i.e. domestic or foreign), rather than the location of the final investor participating in securities settlement systems. Firstly, foreign investors that have remote access to the investor (I)CSD should in general be subject to the same set of rules as domestic ones. Therefore, the location of a remote participant is, from the point of view of the investor (I)CSD, not relevant as such. Secondly, the settlement of a foreign security in the investor (I)CSD between an investor and its counterparty, both located in the same country as the investor (I)CSD, will – in accordance with the BIS definition – not be classified as cross-border but as domestic settlement.

However, investor (I)CSDs can only hold and organise settlement in such foreign securities by means of a cross-border link with the issuer (I)CSD⁽²⁾. As a result, the BIS definition of cross-border settlement does not completely match the cross-border dimension of (I)CSD links.

1.2 Cross-border settlement through (I)CSD links

As a rule, executing cross-border settlement in foreign securities requires an investor (I)CSD to establish a link with an issuer (I)CSD. The settlement process, however, largely depends on where the counterparties to a transaction hold their securities account. Consequently, two main types of cross-border settlement can be distinguished, i.e. cross-system settlement and internal settlement at the investor (I)CSD.

1.2.1 Cross-system settlement

By establishing links with various issuer (I)CSDs, an investor (I)CSD allows its participants to centralise their foreign securities holdings and to settle buy and sell transactions in foreign securities within a single system. A cross-border settlement with a counterparty located in the issuer (I)CSD can be categorised as cross-system settlement, as the securities need to be transferred between the investor (I)CSD and the issuer (I)CSD involved. Cross-system settlement can be executed against payment or free of payment⁽³⁾. For against payment transactions, the transfer of securities is accompanied by a transfer of cash. Box 2 explains how cash transfers related to securities transactions are settled.

(1) This is the criterion used in the BIS definition (1995).

(2) (I)CSDs may have links with foreign as well as with domestic (I)CSDs.

(3) In the European context, the use of most links between CSDs is restricted to free of payment securities transfers mainly for collateral realignments between inter-company securities accounts, or for the mobilisation of cross-border collateral for ESCB credit operations. It should be noted that foreign securities issued in a CSD can subsequently be settled against payment internally between two counterparties in the investor CSD even if the link between the investor CSD and issuer CSD is free of payment.

Box 2 – Settlement of cash obligations in securities transactions

The cash settlement agent, whose assets are used to settle the payment obligations arising from securities transfers within an (I)CSD, could be either a central bank or a commercial bank. Traditionally in Europe, assets used for settlement of securities transactions in a CSD are a claim on the local central bank, i.e. settlement is in central bank money. Foreign investors in a CSD may not always have direct access to intraday liquidity or credit in the settlement currency with the local central bank. They will therefore use a local settlement bank to settle funds transfers on their behalf in the books of the central bank. As a result, such investors settle in commercial bank money although the ultimate cash settlement agent is the local central bank of the country where the CSD is located.

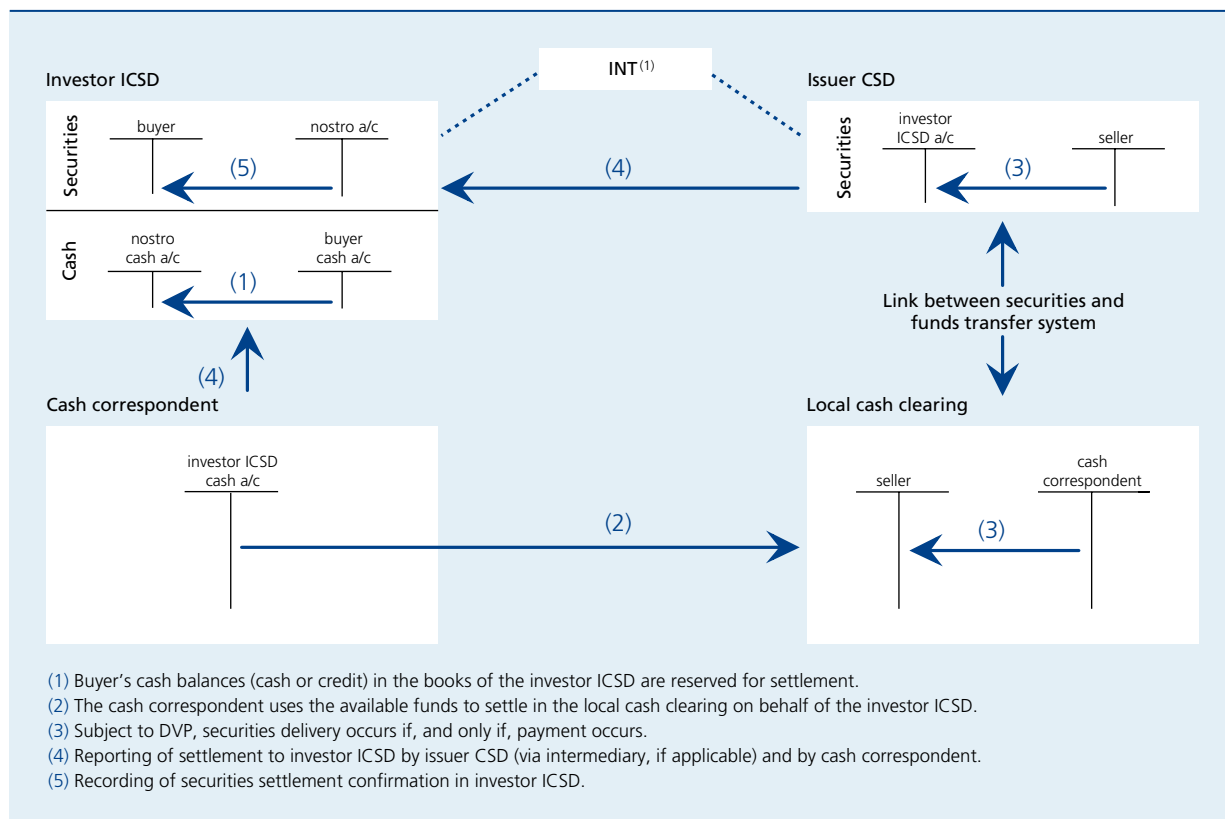
ICSDs typically have banking status and settle on their own books in commercial bank money, since the vast majority of their participants do not have access to central bank credit in the country or monetary zone where the ICSDs are established. Also, ICSDs operate a multi-currency settlement system providing – like global custodians – multi-currency banking and cash management services for their participants.

ICSDs have set up links with other (I)CSDs to transfer foreign securities against payment. Cross-system settlement through (I)CSD links requires settlement in the books of the issuer (I)CSD. In the Eurosystem, in accordance with the current rules, operators of securities settlement systems are not entitled to obtain central bank credit unless they are credit institutions established in that country. To execute the settlement of cash obligations in securities transactions, the investor ICSD will make use of settlement banks or cash correspondents to access the local cash clearing system in the country of the settlement currency. Settlement is therefore executed in commercial bank money instead of on the books of the local central bank. As a rule, and for efficiency reasons, the intermediary holding the securities positions also plays the role of cash correspondent on behalf of the investor ICSD.

The investor (I)CSD may have access to the issuer (I)CSD either directly (i.e. direct or operated link) or indirectly through an intermediary (i.e. indirect or relayed link). Due to the intermediation, the chaining process of cross-border settlement through indirect and relayed links is longer. The main steps for executing a cross-border settlement remain, however, the same for all types of links. Chart 1 below assumes that the participant in an investor ICSD is buying foreign securities from a local counterparty that participates in the issuer CSD. It is further assumed that the issuer CSD settles in the books of the local central bank with which it has a technical link in place. The investor ICSD will therefore make use of cash correspondents to provide the connection with the local cash clearing system. Upon settlement in the local issuer CSD, securities are transferred from the seller's securities account to the investor (I)CSD's omnibus account in the case of direct and operated links, or to an intermediary's omnibus account in the case of indirect or relayed links. When the issuer CSD settles securities transactions on a delivery-versus-payment (DVP) basis, securities and cash transfers are organised so as to ensure that a delivery occurs if, and only if, payment occurs.

After settlement, the issuer CSD or the intermediary will send a confirmation report to the investor ICSD. Upon receipt of this report, the investor ICSD will record the settlement confirmation by crediting the received securities on the buyer's securities account. The cash correspondent will also deliver a report to confirm the execution of the payment related to the securities transaction.

It cannot be excluded that, when intermediaries involved in cross-border settlement through indirect and relayed links (i.e. local agents, global custodians or (I)CSDs) have sufficient critical mass of clients buying and selling securities, settlement of foreign securities transactions is internalised in their own books, without having to process the transaction at the level of the issuer (I)CSD. Internalisation of settlement would be possible if the counterparty of an investor (I)CSD's participant has an account in the books of the intermediary. Although the issuer (I)CSD is not directly involved in such transaction, this also induces a cross-system transfer from the perspective of the investor (I)CSD. The possibility to internalise settlement at the level of the intermediary might be part of the service offered by the intermediary for the investor (I)CSD (e.g. better instruction deadlines or cost reductions in general).

CHART 1 CROSS-SYSTEM SETTLEMENT
(Securities and cash leg)

(1) INT is the intermediary in case of indirect or relayed links holding a securities account on behalf of the investor ICSD in the issuer CSD.

1.2.2 Internal settlement at the investor (I)CSD

Settlement of foreign securities can be internalised at the level of the investor (I)CSD if both buyer and seller have a securities account in the investor (I)CSD. The type of link as such is not relevant to enable internal settlement at the level of the investor (I)CSD. As shown in Chart 2, securities transactions are settled internally in the books of the investor (I)CSD, without settlement on the accounts of the issuer (I)CSD, and without settlement on the books of an intermediary in the case of indirect links or relayed links. Technically, the recording of the transfer of securities takes place in the books of the investor (I)CSD only. As the investor (I)CSD holds the foreign securities positions in the system of the issuer (I)CSD, the link would, for this type of transactions, function as a mere cross-border custody arrangement between the (I)CSDs involved.

An investor CSD would generally internalise against payment transactions in the home currency of the central bank with which its system is connected. In contrast, participants of an ICSD hold cash accounts in different

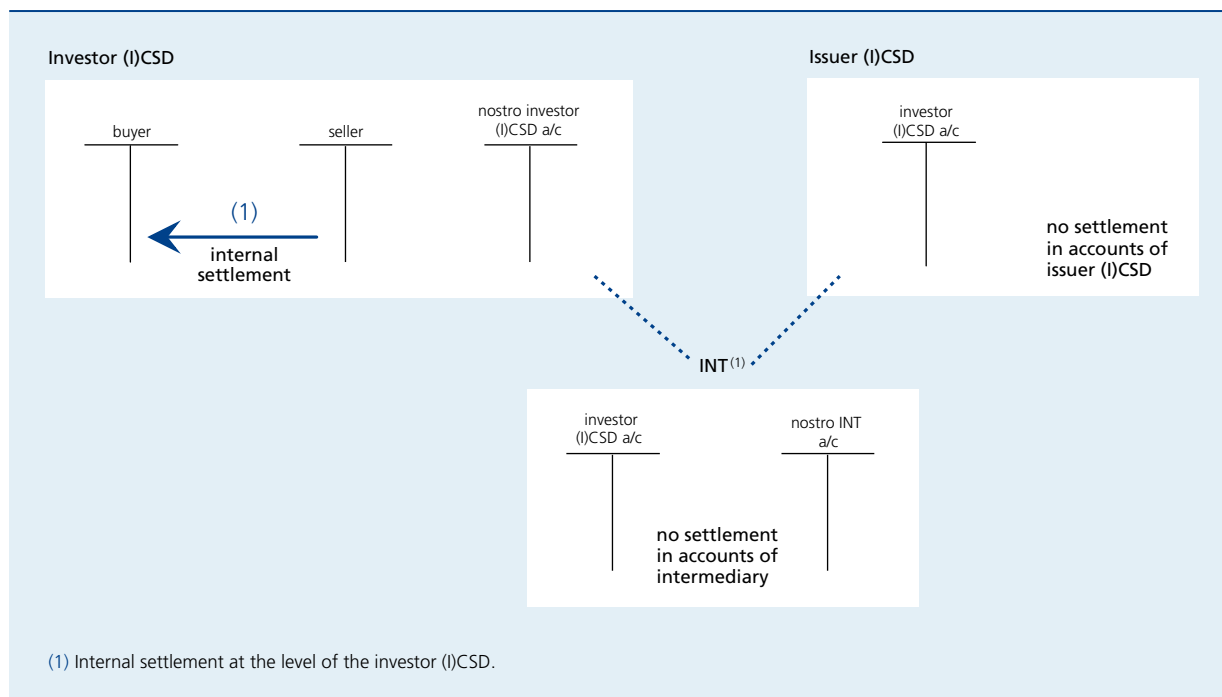
settlement currencies in the books of the ICSD. As a result, investor ICSDs can internalise cross-border settlement against payment in their own books in a wide range of currencies. The settlement asset for foreign securities is then commercial bank money instead of central bank money, as in the case of domestic securities transactions settled in the issuer CSD⁽¹⁾.

A special case of a cross-border settlement through a link is the "Bridge" which has been established between Euroclear and Clearstream, the two major European ICSDs. In this scheme, both ICSDs settle transactions in foreign securities bilaterally before updating the resulting positions at the level of the local CSD where the securities are issued. This specific case of internal settlement is further explained in Box 3.

(1) ICSDs settle in commercial bank money but may also offer the possibility to settle in central bank money.

CHART 2 INTERNALISATION AT THE INVESTOR (I)CSD

(Securities leg only)



(1) INT is the intermediary in case of indirect or relayed links holding a securities account on behalf of the investor ICSD in the issuer CSD.

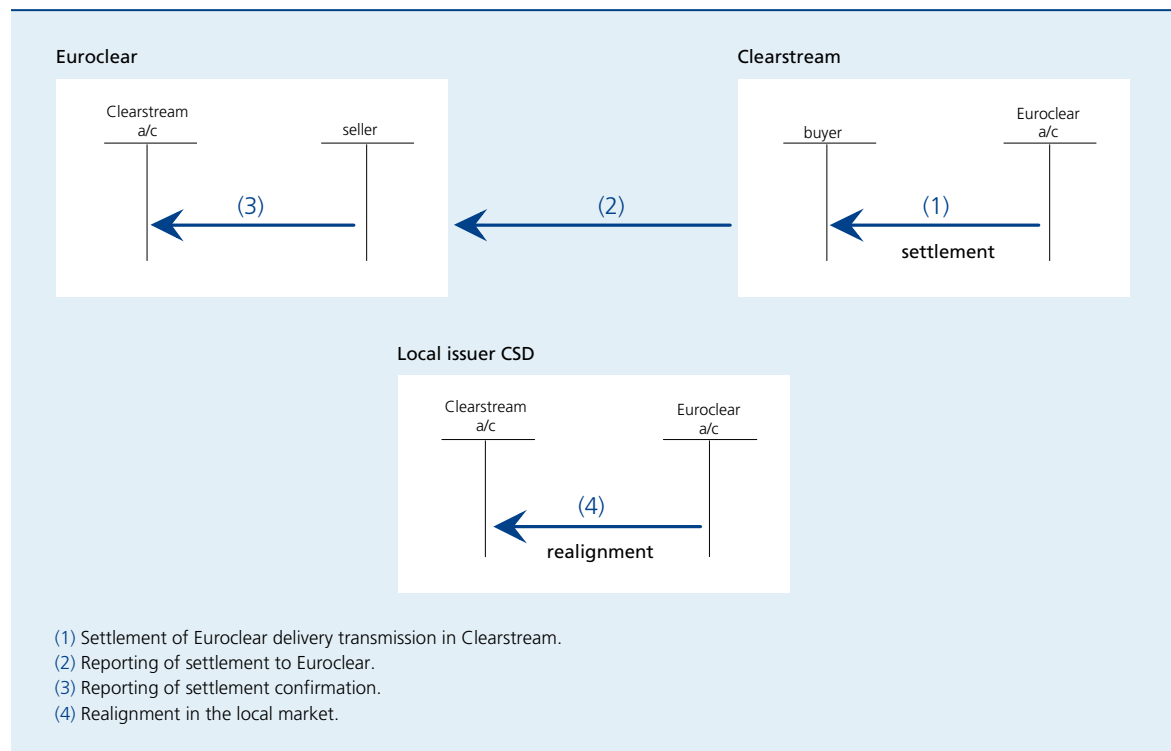
Box 3 – Cross-border settlement through the Bridge between Euroclear and Clearstream

The “Bridge” is a reciprocal direct link between Euroclear and Clearstream that permits cross-system settlement of trades between participants in these two ICSDs. Both ICSDs have a securities (and cash) account with the other ICSD. International securities are eligible for settlement across the Bridge, as well as a wide range of foreign securities issued in local CSDs for which both Euroclear and Clearstream have established a link. In the example illustrated in Chart 1 below, the participant in Euroclear is selling foreign securities to its counterparty who participates in Clearstream. This type of transactions settled across the Bridge is booked on the ICSDs’ securities accounts held with the other ICSD, not in the books of the local CSD where the securities are issued. As a result, there is no settlement on the accounts of the issuer CSD. However, the respective securities positions of Euroclear and Clearstream with the issuer CSD should be updated afterwards in order to reflect the effective securities positions held by both ICSDs in the name of their clients. To achieve this, Euroclear and Clearstream have put procedures in place to realign cross-holdings between them. In practice, realignments are based on net settlement results of Bridge transactions. As a result, from the perspective of the issuer CSD, foreign securities transfers between the ICSDs executed through the Bridge could be considered to some extent as internal cross-border settlement.



BRIDGE SETTLEMENT OF FOREIGN SECURITIES

(Securities leg only)



2. Risks for (I)CSDs in cross-border settlement through links

2.1 CPSS-IOSCO Recommendation for Risks in Cross-Border Links

Risks related to cross-border settlement through (I)CSD links have been addressed by the CPSS-IOSCO Recommendations for Securities Settlement Systems (November 2001) and the accompanying Assessment Methodology for Recommendations for Securities Settlement Systems (November 2002). CPSS-IOSCO Recommendation 19 about "Risks in cross-border links" and the related key issues are covered in Box 4.

For legal and custody risks in cross-border links, CPSS-IOSCO refers to Recommendation 1 ("Legal framework") and 12 ("Protection of customers' securities"). To cover those risks in the context of cross-border links, it should be verified whether "the rules of each (I)CSD and the terms of any associated contracts are supported by the legal

framework, including insolvency law, in each jurisdiction in which the linked (I)CSDs operate". The protection of customer securities "should be addressed in the design and operation of links to settle cross-border, particularly the need to reconcile holdings to determine that they are accurate and current".

2.2 Risks for (I)CSDs in cross-border securities settlement through links

In the case of cross-border settlement through links, investor (I)CSDs are running specific risks which may be more complex than risks in pure domestic securities transactions. This is mainly caused by the involvement of multiple legal jurisdictions and by the use of intermediaries⁽¹⁾. Some differentiation regarding the level and type of risks should be made between cross-system and internal cross-border settlement of foreign securities.

(1) See also BIS (1995) "Cross-Border Securities Settlements" which presents an analysis of risks in cross-border settlement at the level of the investor.

Box 4 – CPSS-IOSCO Recommendation and Key Issues for Cross-Border Links

Recommendation 19: Risks in cross-border links

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

Key issues:

1. CSDs should design links to ensure that settlement risks are minimised or contained. A CSD should evaluate the financial integrity and operational reliability of any CSD with which it intends to establish a link.
2. DVP should be achieved and provisional transfers across the link should be prohibited, or, at a minimum, their retransfer prohibited, until the first transfer is final.
3. Any credit extensions between CSDs should be fully secured and subject to limits. Liquidity management arrangements should be implemented to address operational inefficiencies and potential defaults.

Source: CPSS-IOSCO (2002), Assessment Methodology for Securities Settlement Systems.

When the investor (I)CSD has a direct securities account in the issuer (I)CSD and conducts a cross-system transfer on behalf of its participants, the investor (I)CSD is subject to the same inherent securities settlement risks as those confronting other participants in the issuer (I)CSD for domestic trades. The use of intermediaries in cross-border links, however, has an impact on the risks borne by the investor (I)CSD. From an operational point of view, the extension of the settlement chain through intermediation could theoretically increase risks for the investor (I)CSD. At the same time, subject to contractual arrangements between the intermediary and the investor (I)CSD, the investor (I)CSD would primarily have a risk exposure on the intermediary instead of on the issuer (I)CSD. This would be the case for cross-system transfers via indirect or relayed links as well as for internalised settlement in the books of the intermediary. Internalisation of settlement at the level of the investor (I)CSD may have an impact on certain risks that arise in cross-system transfers or intermediation in links.

Below, the article identifies risks in cross-border settlement related to the (1) legal, (2) settlement, (3) financial, (4) control and (5) operational environment in which the (I)CSD link operates. Specifications according to the type of cross-border settlement and its impact on the relevant risks are made if deemed necessary.

2.2.1 Legal risk⁽¹⁾

By definition, cross-border settlement of foreign securities through links involves multiple legal jurisdictions. Legal risks in cross-border settlement include the choice of law governing the relationship between the parties involved and problems related to conflicts of laws. These risks have to be addressed by the legal and contractual framework of the link between the investor (I)CSD and the local issuer (I)CSD, or the intermediaries involved (in the case of indirect or relayed links, the investor (I)CSD does not have any direct contractual arrangements with the issuer (I)CSD).

Local regulation should also be taken into account to assess the eligibility of foreign securities for internal settlement with the investor (I)CSD (e.g. whether foreign securities are required to be settled through an agent located in the country of issue). Local asset protection rules need to ensure that, in the case of bankruptcy or insolvency, the securities held by the investor (I)CSD on behalf of its participants are protected against the claims on the issuer (I)CSD or intermediary's creditors. Other reasons than

⁽¹⁾ Legal risk is the risk that a party will suffer a loss because laws or regulations do not support the rules of the securities settlement system, the performance of related settlement arrangements, or the property rights and other interests held through the settlement system. Legal risk also arises if the application of laws and regulations is unclear (BIS (2003), "Glossary of terms used in payments and settlement").

bankruptcy or insolvency for blocking foreign securities (i.e. attachment by the issuer (I)CSD or intermediary's creditors, freeze or blocking instructions from local courts or regulators) need to be assessed. Legal risk also includes custody risk which is defined as the risk of loss of securities held in custody occasioned by the insolvency, negligence or fraudulent action of the custodian or of a sub custodian. Investor (I)CSDs typically use intermediaries in cross-border links, who may again subdeposit securities with other intermediaries (i.e. typically the issuer (I)CSD). The involvement of multiple agents (i.e. tiering of holdings) has an impact on custody risk.

At the level of the investor (I)CSD, the effectiveness of client recovery rules should also be assessed in the case of bankruptcy or insolvency of the investor (I)CSD. Possible legal or practical uncertainties in the home jurisdiction might have an impact on the speed with which foreign assets held through links are recovered by the liquidator.

In the European context, some of the legislation relating to securities settlement has been harmonised. The Settlement Finality Directive, for example, aims at reducing the systemic risk associated with participation in payment and securities settlement systems, and in particular the risks caused by the insolvency of a participant in these systems⁽¹⁾. Settlement of a transaction is to be considered irrevocable and unconditional in accordance with local market finality rules. If the investor (I)CSD receives provisional transfers of funds and securities via a cross-system settlement, an unwinding of such transactions due to an insolvency or failure of a local participant in the issuer (I)CSD could create credit and liquidity problems for participants in the investor (I)CSD. Moreover, settlement could also be reversed due to existing claw-back rules in the local market⁽²⁾.

2.2.2 Settlement model

Cross-system transfers with the issuer (I)CSD are executed in accordance with the applicable settlement model of the local issuer (I)CSD. The settlement cycle has an impact on replacement cost risk (or pre-settlement risk) which is the risk that a counterparty to an outstanding transaction for completion at a future date will fail to perform on the contract or agreement during the life of the transaction. The resulting exposure is the cost of replacing the original transaction at current market prices.

When cross-system transfers are executed with a counterparty in the issuer (I)CSD, the investor (I)CSD runs a settlement risk on that local counterparty. Settlement risk is a general term designating the risk that settlement in a transfer system will not take place as expected. When

the issuer (I)CSD has a DVP mechanism in place, principal risk for the investor (I)CSD will be eliminated, i.e. the risk that the seller of a security delivers a security but does not receive payment, or that the buyer of a security makes payment but does not receive delivery. The DVP model applied by the issuer (I)CSD will have an impact on replacement cost risk, as well as on liquidity risk (i.e. the risk that a counterparty in a settlement system will not settle an obligation on time). In gross settlement systems (DVP Model 1), replacement cost and liquidity risks could materialise throughout the batch/day on an operation-by-operation basis. In net systems (DVP Model 2 & 3), however, replacement cost and liquidity risks are typically built up during the batch/day and could materialise on a net basis at the end of the batch/day.

The settlement model is also defined by the cash settlement assets used, i.e. central or commercial bank money. As a rule, the investor (I)CSD will settle transactions in the local market through cash correspondents, as it has no direct access to central bank liquidity or credit. By holding cash balances with cash correspondents it bears cash deposit risk.

In the case of internalisation (i.e. at the level of the investor (I)CSD or intermediary), cross-border settlement is executed outside the local issuer (I)CSD and is therefore subject to other rules than those of the issuer (I)CSD. The DVP settlement model, for example, applied in the investor (I)CSD might be different from the one in the issuer (I)CSD, whereas internalising settlement at the level of intermediaries, such as local agents or global custodians, might make DVP rules less transparent. Moreover, for internal cross-border settlement at the level of the investor (I)CSD, securities and cash transfers are settled in only one system, as no settlement occurs in the books of the issuer (I)CSD or an intermediary. Consequently, settlement rules applicable in the local market do not have an impact on the settlement process in the books of the investor (I)CSD.

2.2.3 Financial strength

By making use of intermediaries in the case of indirect and relayed links, the investor (I)CSD has to check the solvency and financial resilience of its intermediary service provider. Since the issuer (I)CSD is part of the settlement chaining process, either active or passive depending on the type of link and cross-border settlement, the analysis has to

(1) The Settlement Finality Directive, adopted in May 1998, contains provisions regarding (1) transfer orders and netting, (2) insolvency proceedings and (3) collateral security.

(2) Claw-back rules are provisions defining circumstances that lead to the reversal of transactions which occurred previously. Whenever claw-back rules exist, by definition, claw-back risk cannot be mitigated within the local jurisdiction.

extend to the financial strength of the issuer (I)CSD to provide comfort regarding the continuity of its business. Moreover, issuer (I)CSDs can grant credit (fully collateralised or not) to their participant; that requires adequate credit and liquidity risk controls to address participants' failures to settle or operational deficiencies. An analysis should also be conducted to find out whether the investor (I)CSD bears any credit or liquidity risk by settling transactions through the link, and to see how these risks are managed at its own level. In accordance with CPSS-IOSCO Recommendation 19, any credit extensions between (I)CSDs should be fully secured and subject to limits⁽¹⁾.

Default procedures to mutualise risk among the participants might be in place in the issuer (I)CSD whereby participants that fail to meet their obligations can settle, thus avoiding further disruption in the system (i.e. guarantee fund). Loss-sharing arrangements can also be applied for the allocation of losses arising from the default of a participant in the local system. When the investor (I)CSD holds a securities account directly in the issuer (I)CSD, it runs the risk of having to participate to the loss-sharing arrangement if such an arrangement has been put in place by the issuer (I)CSD.

2.2.4 Control environment

The investor (I)CSD needs to be confident that the issuer (I)CSD and the intermediaries involved in cross-border settlement through links are subject to effective controls by internal and external audit. The regulation and oversight of securities settlement systems and the division of responsibilities among public authorities varies from country to country, depending on the legal and institutional framework. Therefore, the investor (I)CSD has to be informed whether the issuer (I)CSD and the intermediary (if applicable) are subject to regulation, supervision or oversight by regulatory bodies, and by whom. In accordance with the CPSS-IOSCO Recommendations, the objectives and responsibilities, as well as the roles and major policies of the securities regulator and the central bank have to be clearly defined and disclosed. In that regard, some authorities have published for their domestic systems a report on the observance of the CPSS-IOSCO Recommendations.

2.2.5 Operational risk⁽²⁾

For cross-system settlement, (I)CSD systems need to be connected – through an intermediary in the case of indirect and relayed links – to exchange information⁽³⁾ and settlement confirmations between systems across the link. Inefficiencies may occur due to differences in communication means, settlement windows or time zones, creating further replacement cost and liquidity risks. The interoperability and efficiency of a cross-system transfer across a link is of particular importance for broker/dealers as they intend to buy and sell the same security for the same value date by back-to-back trades⁽⁴⁾. Inefficient links could affect liquidity needs for broker/dealers, as they may have to block securities beforehand or borrow securities and funds to realise same day turnaround of securities.

This type of operational risk would, in theory, increase with the number of intermediaries involved. As an operational risk in a linked system may affect or delay settlement for the investor (I)CSD, business continuity arrangements in place with the issuer (I)CSD and intermediaries (incl. business continuity plans, back-up sites and testing) need to be addressed in the investor (I)CSD's analysis of the link.

On the other hand, internalisation of cross-border settlement through an (I)CSD link can neutralise some operational risks due to a shorter settlement chain. When there is an internal settlement at the level of the investor (I)CSD, the link is a pure custody arrangement without the need to exchange settlement related information across the link. Operational problems with the issuer (I)CSD might not necessarily have an impact on the internal settlement of foreign securities in the investor (I)CSD, limiting operational and systemic risks. Where settlement is internalised at the level of the intermediary, information is still exchanged between the investor (I)CSD and the intermediary, not with the issuer (I)CSD.

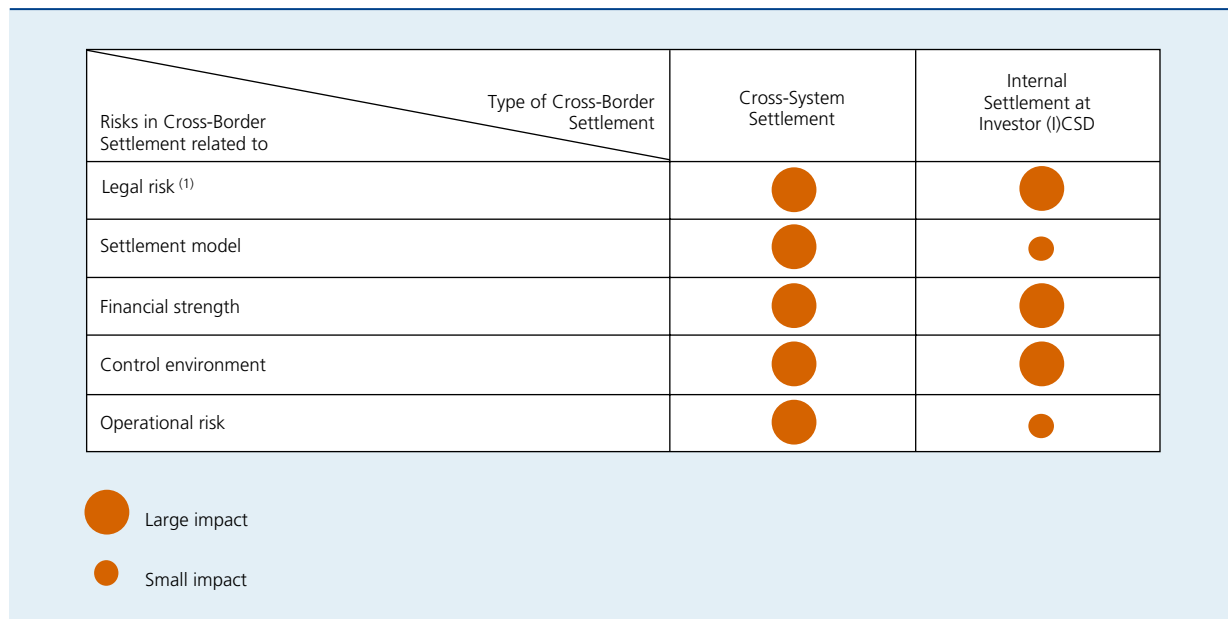
Chart 3 below gives, per category of risks, an overview of the possible impact of risks on the investor (I)CSD settling foreign securities via cross-system transfers across the link or via internalisation in its own books. There is no differentiation according to the type of link in the case of cross-system settlement since, for indirect and relayed links, the relevant risk exposures on the issuer (I)CSD are largely shifted to the intermediary. By internalising settlement at the investor (I)CSD, some risks that are typical for cross-system transfers through a link can be neutralised. The settlement model applicable in the issuer (I)CSD as well as the interoperability of the link would not have an impact on the settlement process in the investor (I)CSD. However, the investor (I)CSD would still bear legal risk (in particular custody risk) for the holding of securities in the

(1) This applies typically to the Bridge between Euroclear and Clearstream.

(2) Operational risk can be defined as the risk of deficiencies in internal controls or the risk of human error or a breakdown of some component of the hardware, software or communications systems that are crucial to settlement (BIS (2003), "Glossary of terms used in payments and settlement").

(3) I.e. information required to complete settlement; in particular to confirm that counterparties have sufficient positions in securities and funds (or access to credit).

(4) Back-to-back trades are pairs of transactions that require a counterparty to receive and redeliver the security on the same day.

CHART 3 IMPACT OF RISKS FOR THE INVESTOR (I)CSD PER TYPE OF CROSS-BORDER SETTLEMENT

(1) Including custody risk

issuer (I)CSD. The quality of the control environment, as well as the financial strength of the intermediary and/or the issuer (I)CSD, also remain relevant for the investor (I)CSD.

3. Risk analysis framework for cross-border (I)CSD links

CPSS-IOSCO Recommendation 19 requires (I)CSDs to conduct a risk analysis of the design of the link as well as of the financial integrity and operational reliability of the linked issuer (I)CSD. The latter may perform different sets of functions (i.e. provision of depository, credit, securities lending, collateral management, custodian and settlement services) which may also be provided through the link. The design of the link is therefore determined by the choice of functions, as well as by the structure of the issuer (I)CSDs themselves and the legal framework applicable in the respective jurisdictions⁽¹⁾. Recommendation 19 does not, however, provide detailed “tools” that specify how this analysis should be done in practice.

In the assessment process of the links of investor (I)CSDs located in Belgium, the NBB has set up, as overseer of securities settlement systems, a Risk Analysis Framework (“the Framework”) that provides guidance on the interpretation of CPSS-IOSCO Recommendation 19 relating to cross-border links. It allows both the NBB, as overseer,

and the investor (I)CSD to conduct a comprehensive assessment of the relevant risks in cross-border (I)CSD links set up by the investor (I)CSD, and to verify whether the investor (I)CSD, subject to the oversight by the NBB, meets CPSS-IOSCO Recommendation 19. The Framework is detailed in Annex 1.

In accordance with CPSS-IOSCO Recommendation 19, the Framework is based on the principle that it is the investor (I)CSD (and not the issuer (I)CSD) that needs to conduct a risk analysis of the link. In the case of indirect links, for example, the issuer (I)CSD might even be unaware that it is linked with an investor (I)CSD as an intermediary will act on behalf of the investor (I)CSD by holding a securities account in its system. As a consequence, (I)CSDs located in Belgium operating as issuer (I)CSDs in links will not have to meet the requirements of the Framework.

In accordance with the Framework, the investor (I)CSD should assess the risks relating to cross-border settlement at the level of the issuer (I)CSD and all other intermediaries (i.e. local agent, global custodian, (I)CSDs) engaged in a particular cross-border link⁽²⁾, regardless of the type of link or cross-border settlement. When a security deposited by

(1) For legal and custody risks, CPSS-IOSCO refers to Recommendation 1 (“Legal”) and 12 (“Protection of customers’ securities”).

(2) Since for a particular link, the intermediary may not function as cash correspondent, the latter should also be covered by some aspects of the Framework.

the investor (I)CSD with its intermediary is subdeposited with another intermediary (i.e. typically the issuer (I)CSD), the latter should also be subject to the Framework.

In practice, the Framework is composed of a list of topics and questions that address relevant risks in cross-border settlement through (I)CSD links related to the legal, settlement, financial, control and operational environment. This set of topics should, at a minimum, be addressed by the investor (I)CSD and reviewed on a regular basis (i.e. every three years at a minimum) or whenever major changes in the functioning of the link have occurred.

Annex 1 : Risk Analysis Framework

Legal risk

Topic 1 :

The regulatory authorisation of the intermediary/issuer (I)CSD to act lawfully as the intermediary/issuer (I)CSD on behalf of the investor (I)CSD

Question

1. Has the investor (I)CSD been confirmed that the intermediary/issuer (I)CSD has obtained all necessary consents, licences, approvals, authorisations or exemptions from any government or any regulatory authority or agency in the local jurisdiction, required in connection with the execution, delivery or performance of the terms of the contract ?

Topic 2 :

The validity and enforceability of the agreement between the intermediary/issuer (I)CSD and the investor (I)CSD

Questions

1. Does the contractual framework between the intermediary/issuer (I)CSD and the investor (I)CSD constitute a valid and enforceable agreement, under applicable law ?
2. Is a Legal Opinion available that covers the validity and enforceability of the contractual framework between the intermediary/issuer (I)CSD and the investor (I)CSD ?
3. Is the Legal Opinion that covers the validity and enforceability of the contractual framework sufficiently recent or recently updated ?

Topic 3 :

The eligibility of the securities to be admitted within the system of the investor (I)CSD

Questions

1. Does the nature of the securities held at the issuer (I)CSD allow the internal circulation of such securities within the system of the investor (I)CSD established in Belgium ; i.e. under the legal regime of the Royal Decree N° 62 ?⁽¹⁾
2. Is it permissible to hold the securities with the issuer (I)CSD in an omnibus account and/or as a nominee in the jurisdiction of the issuer (I)CSD ?
3. Is it obligatory to obtain a local licence to hold securities with the issuer (I)CSD as a nominee (or otherwise) in this jurisdiction or to settle transactions in such securities ?
4. Are there any holding or ownership restrictions or disclosure requirements with respect to securities held with the issuer (I)CSD applicable to the investor (I)CSD ?

(1) Royal Decree N° 62 dated 10 November 1967 governs the deposit, transfer and pledge of securities held on a fungible basis. Fungibility refers to the method of holding securities by an (I)CSD or other financial intermediary in which each of a number of issues of physical or dematerialised securities are held in separate fungible pools. No owner has the right to any particular physical or dematerialised security in a particular pool, but has a co-ownership right to such an amount of physical or dematerialised securities as shown in its account with an (I)CSD or other financial intermediary.

Topic 4:

The adequacy of local asset protection rules

Questions

1. In the case of a bankruptcy or other insolvency event concerning the intermediary/issuer (I)CSD, does applicable legislation provide that the assets deposited by the investor (I)CSD do not form part of the assets of the intermediary/issuer (I)CSD? In this respect, is the legal nature⁽¹⁾ of the holding of the foreign securities in the local jurisdiction a relevant criterion?
2. In the case of a bankruptcy or another insolvency event concerning the intermediary/issuer (I)CSD, does applicable legislation provide that the investor (I)CSD has undisputed and timely access to any assets deposited with its intermediary/issuer (I)CSD without having to face legal or other challenges?
3. Regarding the “undisputed and timely access” in the case of bankruptcy or any other insolvency event concerning the intermediary/issuer (I)CSD, does the Legal Opinion identify and explain (i) any practical hurdles impeding the investor (I)CSD’s recovery of the securities held with the intermediary/issuer (I)CSD, (ii) any possibility that exists under local law for third party creditors or other interested parties to block the investor (I)CSD’s recovery, and (iii) the likely timeframe of the recovery process?
4. Is the Legal Opinion that covers the adequacy of local asset protection rules sufficiently recent or recently updated?

Topic 5:

The effectiveness of client recovery rules⁽²⁾

Question

1. In the case of bankruptcy or any other insolvency event concerning the investor (I)CSD, would the liquidator have undisputed and timely access to any assets deposited with the intermediary/issuer (I)CSD?

Topic 6:

Information about potential attachment/blocking of securities held with the intermediary/issuer (I)CSD

Questions

1. Can securities held by the investor (I)CSD with the intermediary/issuer (I)CSD be subject to any attachment by creditors of the intermediary/issuer (I)CSD, of the investor (I)CSD or of the ultimate beneficiary, or to freezing or blocking instructions issued by local courts or regulators?
2. Has the investor (I)CSD received adequate information about these issues, and is such information sufficiently recent or has it been recently updated?
3. Has the investor (I)CSD adequately informed its participants of such risks, if any?

Topic 7:

Applicability of local finality rules

Question

1. Has the investor (I)CSD analysed the moment of irrevocability of transfer orders as well as the finality of the securities and cash transfers?

(1) The legal nature of the holding of securities is an indication of the level of protection of participants. When the securities holding is property based, the securities do not form part of the estate of an (I)CSD or other financial intermediary and – in the event of insolvency – a liquidator cannot exercise claims on them. This protection is not assured if participants have only a contractual claim on securities, as they will not get a preferential treatment by the liquidator.

(2) The assessment focuses on possible legal or practical uncertainties which might have an impact on the speed with which assets are returned to the participants of the investor (I)CSD, rather than the overall quality of the Belgian asset protection rules.

Settlement model

Topic 1 :

Settlement environment

Questions

1. What is the settlement cycle applicable in the local market (per product) ?
2. Is matching of transfer instructions binding in the local market and, if so, as of when does matching become binding ?
What are the consequences for failing to meet settlement obligations ?

Topic 2 :

DVP model and finality

Questions

1. What is the DVP model applied in the intermediary/issuer (I)CSD ?
2. Does the DVP model applied in the intermediary/issuer (I)CSD differ depending on the type of transaction⁽¹⁾, the type of security transferred, or the currency in which payment is to be made ?
3. At what time or after what event(s) do securities and cash transfers become final ?
4. Does the timing of finality differ depending on the type of transaction, the type of security transferred, or the currency in which payment is to be made ?
5. Does the investor (I)CSD only credit securities to its participants after finality is achieved on the local market (i.e. no unwinding risk) ?
6. Are the participants of the investor (I)CSD clearly notified by the Operating Procedures whether securities and funds transfers are provisional and as of when they are to be considered final ?

Topic 3 :

Settlement asset

Questions

1. Are securities and funds transfers processed within the same system or in different systems ? In the latter case, how are the two systems linked ?
2. Does the intermediary⁽²⁾/issuer (I)CSD settle in central bank money ? If not, what are the mitigating measures in place in the intermediary/issuer (I)CSD with respect to the cash settlement asset ?

Financial strength

Topic 1 :

Solvency and financial resilience

Questions

1. Is the intermediary/issuer (I)CSD a public or private sector entity ?
2. What is the ownership structure of the intermediary⁽³⁾/issuer (I)CSD, and what entity operates the intermediary/issuer (I)CSD ?
3. What is the financial strength⁽⁴⁾ of the intermediary/issuer (I)CSD ?

(1) An (I)CSD could apply different DVP models for settlement of stock exchange trades or over-the-counter trades.

(2) In the case of relayed links where the intermediary is another (I)CSD.

(3) In the case of relayed links where the intermediary is another (I)CSD.

(4) This could be assessed by evaluating the intermediary/issuer (I)CSD's ratings and BIS capital ratio, if available.

4. Does the intermediary⁽¹⁾/issuer (I)CSD provide credit extensions or advances of funds, and how are credit and liquidity risks mitigated within the intermediary/issuer (I)CSD?
5. Does the intermediary⁽²⁾/issuer (I)CSD act as a principal in the settlement process? Is the intermediary/issuer (I)CSD engaged in other types of risk generating activities?
6. What is the applicable liability regime of the intermediary/issuer (I)CSD to participants? (incl. the standard of liability, the force majeure standard and any limitation to the liability regime, if any)?
7. Does the intermediary/issuer (I)CSD have an insurance policy in place to cover its liabilities?
 - 7.1 What are the types of risks covered by the insurance contract?
 - 7.2 What is the amount insured?
8. Does the investor (I)CSD run any credit or liquidity risk by settling transactions through the link, and how are these risks managed?

Topic 2:

Default procedures⁽³⁾

Questions

1. How and on what authority would a decision to unwind securities or funds transfers be made in the issuer (I)CSD?
2. In the case of an unwind, would this affect all provisional securities and funds transfers or only a subset thereof? For the latter, which procedures are in place to determine which transfers are unwound and in what order?
3. Is a guarantee fund in place to prevent contagion effects of a participant's default? What is the amount of the guarantee fund?
4. Is a loss-sharing arrangement in securities or in cash applicable in the intermediary/issuer (I)CSD in the case of a non-recovery of losses incurred?
5. Have either a decision to unwind securities or funds transfers, the guarantee fund or the loss-sharing arrangement ever been applied in the past? If so, what was the cause and the impact of this event?

Control environment

Topic 1:

Control, regulation and oversight

Questions

1. Is the intermediary/issuer (I)CSD subject to licensing, supervision, oversight?
 - 1.1 What institutions are responsible for licensing, supervision, oversight?
 - 1.2 Has the institution responsible for licensing, supervision, oversight disclosed assessment results?
2. Is the intermediary/issuer (I)CSD subject to internal audit?
3. Is the intermediary/issuer (I)CSD subject to external audit?
 - 3.1 What is the name of the external auditor?
4. Does the intermediary/issuer (I)CSD have an anti-money laundering policy in place?
5. Is the investor (I)CSD aware of a history of any losses at the intermediary/issuer (I)CSD? If so, how have such losses been covered?

(1) In the case of relayed links where the intermediary is another (I)CSD.

(2) In the case of relayed links where the intermediary is another (I)CSD.

(3) Procedures in place with the intermediary/issuer (I)CSD in the case of a participant default.

Operational risk

Topic 1 :

Communication interface

Question

1. Does the intermediary/issuer (I)CSD have a proprietary system in place and/or are SWIFT messages used? If SWIFT messages are used, are they ISO15022 compliant?

Topic 2 :

Outsourcing

Question

1. Does the intermediary/issuer (I)CSD make use of an external service provider in core functions? If so, what are these core functions?

Topic 3 :

Business continuity

Questions

1. Does the intermediary/issuer (I)CSD have a formal business continuity plan in place?
 - 1.1 What are the major elements of the business continuity plan?
 - 1.2 What is the expected recovery time?
 - 1.3 Does it include participation by members/clients?
 - 1.4 Is this plan available for review by members/clients?
2. Does the intermediary/issuer (I)CSD have a back-up site?
 - 2.1 What is the distance of the back-up site from the main site?
 - 2.2 Is it a cold/warm/hot back-up site⁽¹⁾?
 - 2.3 How are data back-ups handled?
3. Has the effectiveness of business continuity plans been tested?
 - 3.1 What is the testing frequency?
 - 3.2 When were contingency plans last tested and what were the results?
4. Does the investor (I)CSD have back-up cash correspondents for the settlement currency of the link?

(1) A hot/cold back-up site is a location that an institution can move to after a disaster if the current facility is unusable. The difference between the two is that a hot site is fully equipped to resume operations while a cold site does not have that capability. There is also what is referred to as a warm back-up site which has the capability to resume some, but not all operations.

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The Belgian Financial Stability Committee initiatives on business continuity planning⁽¹⁾

Introduction

The 11 September 2001 disaster gave a new dimension to the issue of the global financial system's resilience to events that could cause disruption in some critical activities or functions. While the concepts of business continuity planning (BCP) and disaster recovery planning (DRP) were not new, they became, in the aftermath of these events and other large-scale terrorist attacks that followed, a top priority both for individual institutions and for financial authorities.

Those tragic events were a harsh warning that the crisis scenarios considered until then had to be supplemented by other more extreme ones. Moreover, it became apparent that the preparations made for the advent of the year 2000, an occurrence which was certain to take place, could not provide a satisfactory response in the case of totally unforeseeable large-scale shocks (earthquakes, floods, terrorist attacks) which are likely to cause severe disruption across a large geographic area. Attention was also drawn to the financial sector's dependence on technical infrastructures, especially IT, telecommunications and public transport facilities, and to the importance for financial institutions of having a recovery site at their disposal in the event of major operational disruption.

This does not mean that central banks and other prudential authorities had previously paid no attention to operational risks.

In the case of credit institutions, operational risks have to be included as from 2007, along with credit risks and market risks, in the first pillar of the new Basel II Accord, i.e. in the minimum capital requirements. This new system will allow banks to use their internal risk management methods in order to calculate their capital requirements, which should encourage banks to upgrade operational risk management methods and therefore enhance the importance of their business continuity management programmes.

For securities and payment settlement systems, the Committee on Payment and Settlement Systems (CPSS) has introduced strict business continuity requirements through the adoption of Recommendation 11 on operational reliability⁽²⁾ of the CPSS-IOSCO Recommendations for securities settlement systems and the Core Principle VII for Systemically Important Payment Systems on security and operational reliability⁽³⁾.

At the international level, one may further refer to the recent Joint Forum initiative which aims at drawing the lessons learned from major events and translating them into a set of High-level principles on business continuity

(1) The main author of this article is Yann Deketelaere.

(2) Recommendation 11 on operational reliability of the CPSS-IOSCO Recommendations for securities settlement systems (November 2001) reads as follows: "Sources of operational risk arising in the clearing and settlement process should be identified and minimised through the development of appropriate systems, controls and procedures. Systems should be reliable and secure, and have adequate, scalable capacity. Contingency plans and back-up facilities should be established to allow for timely recovery of operations and completion of the settlement process", see section 3.58 for BCP issues on www.bis.org/cpss/index.htm.

(3) Core Principle VII reads as follows: "The system should ensure a high degree of security and operational reliability and should have contingency arrangements for timely completion of daily processing", see section 7.7.18 and following for BCP issues on www.bis.org/cpss/index.htm.

which are relevant across national boundaries and financial sectors (i.e. banking, securities and insurance)⁽¹⁾.

At the national level, the Belgian Banking, Finance and Insurance Commission (CBFA) issued in 2005 a circular on “*Good management practices as regards the business continuity of financial services*”⁽²⁾. The circular lists a number of criteria which the CBFA intends to use in order to assess the business continuity strategy of the financial institutions under its supervision (e.g. credit institutions, insurance companies and investment firms).

However effective the arrangements made at the level of the individual firms may be, the resilience of the global financial system will be heavily dependent on the weakest link, as was made clear by the events of September 11. It is therefore of the utmost importance that every critical financial institution or infrastructure put into place broadly equivalent arrangements, in order to be able to recover interrupted transactions and resume new transactions in a very short time frame in the event of being affected by any kind of operational disruption. Otherwise, the unavailability of one financial institution/infrastructure could in fact jeopardise the activity of some or all of the other financial institutions/infrastructures, as a disruption of critical processes can have material adverse consequences for the financial system and prevent significant market participants from completing transactions and meeting their obligations.

This explains why several countries launched BCP initiatives in order to identify the critical players in their financial system, to obtain a clearer view of the state of preparation of these institutions for the smooth operation of the national – or indeed global – financial system, and to identify any single points of failure (SPoF) at the level of the financial system as a whole.

BCP encompasses all measures taken to ensure the continuity of operating services, namely the measures taken to ensure that the IT infrastructure is restarted following an incident. One sub-component of BCP is DRP, namely the measures taken to ensure that the IT infrastructure is restarted following an incident. In this recovery process, a further distinction is made between recovery, i.e. the reconstruction of specific business operations following a disruption to a level sufficient to meet outstanding obligations, and resumption, i.e. the ability to accept new transactions and to resume business as usual. Box 1 presents some definitions of key BCP concepts.

(1) See for more information on these High-level principles on business continuity: www.bis.org/bcbs/jointforum.htm.

(2) CBFA Circular on Good management practices as regards the business continuity of financial services, 10 March 2005, PPB 2005/2, to be found on www.cbfa.be.

Box 1 – Key BCP concepts

Alternate site: a site held in readiness for use during a business continuity event to maintain an organisation's business continuity.

Business continuity management is a holistic management process that includes policies, standards and procedures for ensuring that specified operations can be maintained or recovered in a timely fashion in the event of a disruption. Its purpose is to minimise the operational, financial, legal, reputational and other material consequences arising from a disruption. Effective business continuity management incorporates business impact analysis, recovery and resumption objectives as well as business continuity plans and testing communication or crisis management programmes.

Business continuity plan: a comprehensive plan of action that sets out the procedures and establishes the processes and systems necessary to continue or restore the operation of an organisation in the event of a disruption.

Business impact analysis is the starting point of every business continuity management process whereby an institution measures (quantitatively or qualitatively) the business impact or loss of business processes in the event of a disruption. It is used to identify recovery priorities, recovery resource requirements and essential staff, and to help shape a business continuity plan.



Operational risk is the risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events.

Recovery objective: the reconstruction of specific business operations following a disruption to a level sufficient to meet outstanding obligations. The recovery time objective is a pre-defined goal for recovering specified business operations and supporting systems to a specified level of service within a defined period following a disruption.

Resumption objective: sets out an organisation's strategy in order to be able to accept new transactions and to resume business as usual.

In Belgium, a national initiative on BCP has been launched, with the support of the Belgian Finance Minister, by the Belgian Financial Stability Committee (FSC). This committee is composed of the members of the management committees of the CBFA and the NBB, chaired by the Governor of the NBB, and has received, by the law of 2 August 2002 on the supervision of the financial sector and on financial services, the mandate to examine issues of common interest to the CBFA and NBB.

This article briefly presents the main initiatives taken by the FSC to enhance BCP in Belgium. Section 1 lists the main institutions, infrastructures and functions identified as critical by the FSC for the smooth operation of the Belgian financial system. Section 2 reviews the main recommendations of the BCP while section 3 details the main activities of the permanent monitoring structure put in place to ensure that the Financial Stability Committee's BCP recommendations are followed up. The last section concludes.

1. Identification of the critical institutions, infrastructures and functions

The FSC identified 5 categories of institutions, infrastructures and functions that are critical for the smooth operation of the Belgian financial system, and addressed specific recommendations to them.

1.1 The NBB's function as lender of last resort

This function refers primarily to the provision of liquid resources to the banking sector in the context of the ESCB's monetary policy, but it also includes the possible provision of liquidity support to individual banks in crisis situations. The continuity of this function entails reliance

on other tasks performed by the NBB, such as the management of current accounts, since liquidity will in principle be credited to the current accounts held by individual banks with the NBB, and collateral management, since liquidity will normally be supplied against collateral.

It also presupposes the operation of large value payment systems (TARGET/ELLIPS) if these liquid resources have to be transferred outside the NBB's books, and the operation of the Belgian public debt securities settlement system operated by the NBB, as those securities constitute the major component of Belgian banks' eligible collateral.

1.2 Large value payment systems, clearing and settlement systems, and suppliers of services critical for the smooth operation of those systems

A second category of players critical for the smooth operation of the Belgian financial system is composed of the large value payment systems (TARGET/ELLIPS) and the securities clearing and settlement systems. The latter category includes primarily the securities settlement systems managed by Euroclear Bank, Euroclear Belgium (CIK) and the NBB, plus – to a lesser extent – the clearing house managed by LCH Clearnet.

Even a temporary interruption in the operation of one of these systems could in fact have a significant impact on the Belgian economy, either by triggering a contagion effect, by making economic transactions more expensive or even impossible, or by damaging the reputation of the Belgian financial centre.

This category also includes the SWIFT messaging system, which performs services critical for the smooth operation of the large value payment systems and the clearing and settlement systems.

1.3 The systemic financial institutions

This category contains the major financial institutions which play a particular role in the operation of the large value payment systems and the critical clearing and settlement systems, namely the main direct participants in ELLIPS, the main clearing members in the clearing systems and the main settlement members or settlement agents in the Belgian and foreign settlement systems (e.g. CLS). In practice, this corresponds to the four large banking groups active in Belgium.

1.4 Retail payment systems

Although they are less critical than the large value payment systems, retail payment systems were also considered important as underpinning for the Belgian economy. Due to the growing importance of electronic payments and withdrawals of banknotes from ATMs in retail payments, the FSC considered it essential to ensure that operators of retail payment systems also meet high standards in terms of business continuity.

1.5 Euronext Brussels

Euronext Brussels presents some specific features. The various operations involved in the trading, clearing and settlement of securities and instruments traded on this platform come under different legal entities. Euronext Brussels is also part of a multinational organisation, so that several of its functions, as well as the main data centres, are not located on Belgian territory.

Moreover, not all of these functions are equally critical. The clearing and settlement operations undoubtedly present a relatively high degree of criticality for the stability of the Belgian financial system. Clearing is performed by LCH Clearnet, and settlement by Euroclear Bank and Euroclear Belgium. Although perhaps not as critical as clearing and settlement, the continuity of the trading function has been considered to be of importance for the Brussels financial centre, as the interruption of the smooth operation of the market for a prolonged period could have serious consequences for the risk management and financial position of some small investment firms with large intra-day trading positions on Euronext.

2. Main FSC Recommendations

The FSC approved, at its meeting on 18 October 2004, a set of recommendations intended to strengthen the capacity of the Belgian financial system to cope – without any prolonged interruption in its operation – with events which could affect the continuity of operations (natural disasters, acts of terrorism, epidemics, cyber-terrorism, etc.).

The FSC decided to follow an approach based on the effects rather than on the causes of the various potential crisis situations. A crisis situation means a situation in which the primary data centre or the operating services are out of action or are inaccessible for whatever reason.

The approach adopted is functional rather than institutional, which means that the same critical financial institution may be subject to different recommendations according to the degree of criticality of the various functions which it performs.

2.1 Recovery and Resumption Time Objectives

The FSC expects critical financial institutions and infrastructures to respect maximum Recovery and Resumption Time Objectives.

As regards recovery, large value payment systems, clearing and settlement systems and suppliers of services critical for the smooth operation of those systems should aim at a Recovery Time Objective (RTO) of 2 hours following the occurrence of an incident⁽¹⁾. The critical financial institutions whose intervention is necessary for the smooth operation of the large value payment, clearing and settlement systems and the debit cards payment systems operator(s) should aim at an RTO of 2 to 4 hours and gradually progress towards the lower end of the range. The other critical financial institutions, retail payment systems and the clearing and settlement operations on Euronext Brussels should be subject to an RTO of 4 hours.

As regards resumption, for all critical infrastructures and for the critical financial institutions whose intervention is necessary for the smooth operation of the large value payment, clearing and settlement systems, the objective should be to resume the activity before the end of the day, possibly by extending the normal operating hours in the case of an incident occurring at the end of the day.

(1) The target of 2 hours is the one adopted by the US authorities and the ECB. It represents a compromise between what is technically feasible, taking account of current technology, and the desire to ensure that the critical infrastructures and financial institutions are able to resume their activity before the end of the day.

These recommendations are targets to be met in the event of a local or regional incident (an incident affecting a geographical area with the same risk profile). The FSC decided not to stipulate the use of any specific technology or architecture, as these are highly complex matters for which the market currently offers a number of solutions and where technological progress is very rapid. Moreover, the FSC asked the critical financial infrastructures to use an architecture and a technology which enable them to attain their Recovery and Resumption Time Objectives even in the case of an emergency on a regional scale.

2.2 Dual office solution and minimum distance between different sites

The FSC also decided to require the critical infrastructures and financial institutions to maintain an adequate distance between their production data centres and their back-up facilities in order to prevent the risk of both being affected by the same incident. However, they must carry out their own risk assessment in order to determine the minimum safe distance between the production centres and back-up facilities.

To determine the minimum distance, the critical infrastructures and financial institutions must take account not only of the costs which they might incur as a result of a temporary interruption in their activities, but also of the potential impact on the financial sector as a whole and on the Belgian economy in general. However, it has not been the FSC's intention to set a single minimum safe distance between the sites of production and back-up data centres for all the critical infrastructures and financial institutions. What is more important than distance is the location of those data centres in places presenting different risk profiles.

The FSC has also considered the dual office solution whereby an institution decides to split up its critical staff, locating them at two operating sites sufficiently far apart to avoid them both being affected by the same regional-scale event. That also enables them to reduce the problems associated with the need to arrange for staff, in the event of an incident, to transfer to the emergency locations at very short notice, in order to adhere to the Recovery and Resumption Time Objectives. Although some major financial institutions located in Belgium switched to this solution, the FSC decided it should not be set as the standard to be achieved by all critical financial institutions. The FSC requested, however, that the critical players aim to set up an architecture which enables them to achieve the same result, namely to respect very short recovery times, to be

protected against the loss of all their critical staff and to cope with an incident on a regional scale.

2.3 Transparent switch to the back-up centres of critical infrastructures

The FSC requested the operators of critical infrastructures to design their DRPs in such a way that the users of these infrastructures do not need to make any technical adjustment if the infrastructure switches its operation to its back-up centre. In other words, the technical switch to the back-up centre should take place with almost total transparency for the users.

2.4 Implementation of the recommendations

The critical actors are expected to comply with the FSC recommendations by the end of 2007.

3. Activities of the permanent monitoring structure

The level of interdependence among the various players in the financial system and the resulting risk of contagion made it desirable to set up a permanent structure combining representatives of the authorities and the financial sector in order to follow-up the FSC recommendations. Moreover, since the risks and technologies are constantly changing, it was considered necessary to adopt an approach which caters for future developments in order to deal with these issues. The permanent structure includes representatives of the NBB, the CBFA, the Treasury, the Federal Crisis Centre and a member of the Staff of the Minister of Finance. It has so far been involved in the following projects.

3.1 Telecommunications

Contacts with the critical financial institutions and infrastructures revealed that they were lacking sufficient information on the configuration of their telecommunication networks. It was therefore not possible to eliminate the risk that these networks contained some Single Points of Failure (SPoF). The FSC therefore decided to set up a specific Task Force to deal with telecommunication issues.

In this context, the critical financial infrastructures and institutions were requested by the Oversight Unit of the NBB and by the CBFA respectively to ask their telecommunication operators for all the necessary information (plans, diagrams, etc.) to check that dual connections to the network genuinely exist and that there are no SPoFs in the connections between their critical data centres. The permanent monitoring structure backed these initiatives by asking the telecommunication operators to take part in this initiative and to give more consideration to BCP issues in their business relations with the financial industry. The permanent monitoring structure is still in the process of analysing the information obtained by the critical financial infrastructures and institutions, which were generally satisfied with the information obtained. These issues will continue to be discussed during an annual meeting with representatives from the critical financial infrastructures and institutions and the telecommunication operators.

The Task Force also carried out an analysis of the level of resilience of the different telecommunication tools in order to identify which tool should preferably be used in the event of a BCP crisis.

3.2 BCP crisis management

The permanent monitoring structure has cooperated with the Federal Government Crisis Centre, the Treasury, the Minister of Finance's staff and the police, in order to put in place an escalation and communication procedure which can be activated in the event of an inter-institutional BCP crisis. This procedure covers both "top down" crises, i.e. crises whose origin is to be found outside the financial sector but with an impact on the financial system, and "bottom-up" crises whose origin is to be found within the financial sector itself. Such a crisis is assumed to occur as soon as the financial institution/infrastructure realises that it will not be able to respect the Recovery and/or the Resumption Time Objectives recommended by the FSC, or as soon as it is apparent that the crisis and the resulting damage and disruption to the critical institution/infrastructure affected could lead to substantial disruption of the smooth operation of other financial institutions or infrastructures.

A BCP crisis team will perform a coordinating role to devise measures which extend beyond the institutions/infrastructures affected. This team will also be, in the event of an inter-institutional crisis, the key contact for the National Crisis Centre, which can provide assistance with communication and the implementation of any measures to limit the impact of the crisis, particularly if its origin is to be found outside the financial sector ("top down crisis").

The BCP crisis team will be supported in its coordinating role by an evaluation team and a communication team.

A specific Task Force has also been mandated by the FSC to develop a communication strategy vis-à-vis the different bodies to be informed in a crisis situation, and to examine which are the most appropriate tools to be used to communicate in the most efficient manner. This Task Force has decided to use a special section of the future Financial Stability Committee website as its key communication tool in the context of a BCP crisis. Moreover, thanks to specific *ex ante* arrangements with the police, financial institutions should be given easier access to their critical buildings even if they are within a security zone established by the police, or access to their alternate sites if they are obliged to migrate from their normal site to their back-up locations.

Further to the setting-up of a generic crisis management procedure, the FSC mandated a specific Task Force to study in more detail some specific crisis scenarios. The Task Force first analysed the risk of a power failure in Belgium, the consequences such an event could have on the financial sector and the need to set up an ad hoc emergency plan. It is currently examining how the protracted unavailability of the debit cards payment systems operator would affect the distribution of cash across the country, and the need to have *ex ante* arrangements with the banks and the funds transporters in order to be prepared in extreme situations. Although cash distribution has not been considered by the FSC as a very sensitive function from a financial stability perspective, it is nevertheless sensitive from an economic point of view in the event of a major crisis affecting the availability of electronic payment at the level of the country as a whole.

3.3 Testing

The FSC recommended that all critical infrastructures and financial institutions should conduct periodic tests on their emergency plans at least once a year.

Apart from internal testing within the institution, the FSC also considered it necessary to conduct bilateral tests with the main counterparties in order to ensure, in particular, that it is possible to communicate between one emergency centre and another. However, there were no requirements concerning multilateral tests on DRP in which multiple critical players simultaneously switch their activities to their back-up site.

The permanent monitoring structure has recently launched initiatives to test the BCP crisis management procedure which became fully operational in late 2005.

Conclusion

This article has reviewed the initiatives taken by the FSC to increase the resilience of the Belgian financial system to operational disruption by issuing recommendations targeting the most critical financial infrastructures and institutions.

The FSC has focused on topics where it could bring an added value to the effort of the critical actors themselves, in order to improve the resilience of the Belgian financial

system as a whole. In particular, one of its priorities has been to create a bridge between the critical financial actors and the competent public authorities such as the Treasury, the Minister of Finance and its staff, the Ministry of Internal Affairs, the police services, the National Crisis Centre, and other public bodies.

In the future, the FSC will be keen to maintain its continuous dialogue with the financial sector by involving all critical actors in its BCP initiatives. The FSC will continue to monitor BCP initiatives taken by its main foreign counterparts and will follow up new trends in business continuity management, e.g. the inclusion of “human risks”, such as the outbreak of pandemic threats. The FSC will also pay special attention to the testing of the new crisis management procedure.

Thematic Articles

Cross-border crisis management: a race against the clock or a hurdle race ?

Grégory Nguyen
Peter Praet

Introduction

In recent months discussion and debate regarding the supervisory architecture for cross-border financial institutions in Europe have become lively and intense. Fed by industry complaints regarding the cost burden associated with the current supervisory framework, in which banking supervision is organised along national lines and cross-border banks must often report to multiple supervisors, these debates have generated many proposals. In one such proposal, the European Financial Services Round Table advocates a lead supervisor model, whereby the authorities supervising the parent institution would play a key role – assisted by a college of supervisors comprised of authorities from countries in which the institution has substantial operations (see European Financial Services Round Table, 2005).

Supervision of financial institutions and management of crises involving these institutions are intrinsically linked; hence proposals relating to the supervisory architecture also have a bearing on the potential organisation of crisis management functions. For instance, the lead supervisor model would emphasize the key role of authorities in the home country, and could lead to difficulties in managing a crisis, at least as long as the question of cost sharing among the countries in which the faltering bank operates has not been resolved. Yet, as noted by the European Commissioner McCreevy (2005), determining “who pays the bill if a part of a banking group becomes insolvent”, i.e. establishing the financial responsibilities of national authorities, constitutes a major issue in crisis management for cross-border banks.

This article addresses issues related to crisis management for cross-border financial institutions. The analysis of the difficulties involved in cross-border crisis management proceeds by first identifying obstacles to swift crisis resolution in a purely domestic context (Section 1). Part of the complexity of crisis resolution is attributable to the fact that banks combine retail and wholesale sources of funding, and they often also operate a mix of business lines. Once domestic crisis management has been analysed, the additional complexities arising in the cross-border context are identified (Section 2).

Although the number of large cross-border banks in Europe is limited, the issues that a crisis of one of these institutions would raise are crucial, particularly as the mere threat of the bankruptcy of a single large cross-border bank could generate significant disruptions in the financial systems of several countries. Yet, cross-border crisis management gives rise to particular challenges. For instance, as suggested above, nationally based crisis management responsibilities for cross-border institutions can lead to conflicts of interest between national authorities in a crisis, and these conflicts are likely to be amplified when public funds are at stake. In addition, defining supervision and crisis management responsibilities along national lines may lead to situations where the authorities’ approach to supervision and crisis resolution is not compatible with banks’ functional and/or business-line approaches to their operations, which often transcend national borders.

After highlighting the difficulties associated with cross-border crisis management, the article draws some implications for cross-border supervision and crisis management functions (Section 3). It also discusses some of the ongoing initiatives aimed at tackling cross-border issues.

1. Crisis management in a domestic context: why is it so complex?

Understanding the rationales underlying the regulation of financial institutions helps to appreciate the complexity associated with the management of a crisis of even a purely domestic bank. Two main rationales justify the regulation of financial institutions:

- First, small uninformed depositors have neither the capacity nor the incentives to monitor bank management; therefore, they need to be represented by an agent who will ensure effective “debt governance” of the institution (the representation hypothesis of Dewatripont and Tirole, 1994). This representation role is taken on by public authorities, who monitor banks in the name of retail depositors.
- A second rationale for bank regulation derives from the observation that bank failures may lead to potential externalities, which can be of two different types. First, banks perform functions that are critical to the financial system and the economy, such as provision of the means of payment and the financing of small and medium-size firms. Bank failures can jeopardize the performance of these functions. In addition, certain individual banks may provide services such as clearing or settlement, custodian services for securities, or correspondent banking, which are also deemed critical for the efficient functioning of the financial system. A second type of externality arises from the possibility of a bank failure generating contagion effects, created by interlinkages between financial institutions, such as lending and borrowing through interbank markets.

Both the organization and the scope of responsibility of financial authorities are influenced by these two rationales. Yet, although financial authorities’ responsibilities may be well delineated in normal times, it may be more complex to define them in a crisis. This section deals with specific challenges arising in the management of a domestic banking crisis.

1.1 Complexity and size of the financial institution

Crisis management is complicated by (1) the combination of retail and wholesale sources of bank funding, as well as by (2) the mix of differing business lines operated by many banks:

- (1) The first rationale for banking regulation, i.e. the protection of small depositors, obviously relates to the retail funding of banks. If banks were funded solely through wholesale sources, this rationale for bank regulation would no longer exist. Protection of retail depositors through deposit insurance may necessitate funds to compensate insured retail depositors in a crisis, up to pre-specified limits. However, if the deposit insurance fund is privately owned and adequately funded, the use of public funds to indemnify the depositors will not be necessary. On the other hand, wholesale sources of funding, such as interbank lending, are combined with retail sources for banks. If wholesale sources of funding react more swiftly than uninformed retail depositors to a crisis affecting the bank, the latter (and consequently the deposit insurance fund) may end up bearing a disproportionate share of the burden of the crisis. In addition, the presence of wholesale sources of funds gives rise to the possibility of contagion across banks via the wholesale funding channel. This prospect of contagion and the associated negative impact on the retail depositors of the affected banks may well result in the use of public funds to aid the initial failing bank, in order to prevent contagion from occurring.
- (2) An additional layer of complexity arises when a bank mixes differing business lines. This is the case in e.g. universal banks. In these banks, a problem initially arising from potentially riskier activities, such as investment banking, may affect the entire institution⁽¹⁾.

The management of a crisis involving a large financial institution, especially if the banking system is already concentrated can lead to a problem referred to as “too-big-to-fail”. Here again, however, the nature of the bank’s operations plays a key role, especially as a “functional” approach (protection of critically important functions) may be preferable to a “size” approach (protection of institutions that are “too-big-to-fail”). To the extent that a bank provides some critically important functions, then this bank may be judged to be “too-critical-to-fail”. As is discussed in Box 1, however, pre-specified, privately funded

(1) A more explicit form of contagion between investment banking activities and retail depositors has been explored in the literature relating to a form of moral hazard by which universal banks may implicitly require its retail depositors to invest in more risky activities (see e.g. Boyd et al., 1998).

mechanisms can be set up to ensure business continuity of critically important functions (see e.g. Hüpkes, 2004).

1.2 Public policy objectives and conflicting interests

Even at a domestic level, the objectives of public policy are potentially conflicting. Three kinds of conflicts are identified: (1) objectives resulting from financial stability policy may conflict with objectives of public policy in other areas; (2) it may be necessary to trade off short term and long term objectives of financial stability; (3) the different financial authorities involved in crisis management may pursue incompatible objectives. Some of these conflicts are illustrated below.

1. Public authorities pursue several objectives simultaneously, relating to industrial policy, competition policy, investor and consumer protection and financial stability. Conflicts between the different objectives can materialize in case of crisis. For instance :

- Competition and financial stability policies are sometimes presented as conflicting: in crisis times, some measures aiming at stabilizing the financial system (such as mergers of distressed banks with healthy ones) may result in higher concentration or subsidies and may conflict with competition policy. In the European Union, some of these measures, even in a purely domestic context, may require prior approval from the European Commission.
- Investor protection and financial stability. listed groups are often obliged by law to disclose any sensitive information. However, the disclosure of sensitive information regarding emergency measures taken in listed banks to safeguard financial stability may be counterproductive if it triggers panic among investors and deposit holders.

2. Even if authorities focus solely on financial stability objectives, in some situations crisis management authorities will have to trade-off long term and short term objectives. In the US, for instance, the Federal Deposit Insurance Corporation Improvement Act (FDICIA) of 1991 requires that authorities adopt least-cost policies, but allows a deviation from the least-cost resolution principle for “essential” banks. The definition of such a policy may generate expectations of future intervention for “essential” banks and consequently may encourage future undesirable behaviour by banks that would like to become essential or that already assess themselves as “essential”. This problem is especially acute in concentrated banking systems.

3. The institutional architecture, at the national level, often comprises several different agencies. Each agency is in charge of the management of a specific aspect of the crisis or intervenes at a different stage in the development of a crisis, ranging from normal times to full blown crisis situations. Although operational arrangements to handle supervisory and crisis management functions vary from country to country, a stylized presentation of the agencies that could possibly intervene in a crisis and their likely roles is given below :

- Supervisory authorities The agency in charge of banking supervision probably possesses the most complete and up-to-date information and is likely to be the first to detect problems in individual institutions that might necessitate the intervention of the other agencies. The organization of supervisory authorities differs from country to country. Supervisors may represent a division of the central bank or be constituted as an autonomous agency and may cover banks, securities and insurance firms or focus only on banking supervision.
- Central bank Circumstances may lead the central bank to act as lender of last resort (LLR). In addition, thanks to its involvement in wholesale liquidity markets and in payment systems, such as Target, the central bank is likely to possess information both on the liquidity position of the ailing bank, and on the repercussions of disturbances on other banks through payment and settlement systems and on wholesale markets in general.
- Deposit Insurance: Deposit insurance schemes insure depositors against losses, subsequent to the default of their bank. The crisis management role of the agency managing the deposit insurance fund can range from the “passive” indemnification role of a pure insurance fund to active participation in crisis resolution. The design of deposit guarantee schemes may differ according to several essential elements, including the scope and pricing of coverage and the funding and ownership of the scheme (see e.g. Eisenbeis and Kaufman, 2005).
- Ministry of Finance (or Treasury) Assistance from the Ministry of Finance may be requested when public funds are needed. Although there is no assurance that the Ministry of Finance will be willing to allocate public funds towards the resolution of a banking crisis, as banking crises are often politically sensitive, with far reaching and costly implications for the economy, it is likely that the Ministry of Finance will want to be involved in crisis resolution,

even in cases in which it is not called upon to allocate public funds.

- Crisis manager, Temporary management, Liquidator or Receiver: A crisis or temporary management or a liquidator, responsible for the management or the winding up of the bank, may be appointed. The manager or the liquidator may have to trade off the interests of several classes of creditors. The role of the management and of the liquidator, as well as their rights and duties and their degree of independence, must therefore be clearly specified beforehand. Their goals may be as diverse as to maximize returns for domestic creditors, to preserve going-concern value, to safeguard financial stability, to protect employment, to ensure business continuity of critical infrastructures, etc.

The presence of several agencies illustrates the need to designate ex ante a crisis coordinator, who would be responsible for coordinating communication and actions in the management of a crisis and for the dissemination of information. Several authorities have a vested interest in being appointed co-ordinator. For instance, the Ministry of Finance may be politically accountable for the allocation of public funds. On the other hand, supervisory authorities are likely to be the first informed of a crisis and possess the most complete set of information on the banking group and on its financial situation, while central banks play a key role in the provision of emergency lending assistance.

Even when a coordinator is appointed, tensions between agencies can arise if their roles and objectives or if the procedures for crisis management are not well defined or are ill-conceived and conflicting, especially if agencies do not internalize the effects of their (in) actions on other

agencies. For instance, in a crisis situation involving a large bank facing a liquidity shortage but with a suspicion of solvency troubles, the lender of last resort may favour a liquidation in order to reduce the risk of financial losses, especially if macro-prudential concerns are limited. If the bank is liquidated, LLR funds are not put at risk, whereas funds from the deposit insurance will be mobilized. The deposit insurance fund, on the other hand, may favour continuation of the bank, in order to avoid its funds being tapped (this problem may be exacerbated by the structure of the fund. For instance, recall that some deposit insurance fund are privately owned). Therefore, the institutional design must clearly specify who takes the ultimate decision when a crisis arises, and on what grounds the decision must be taken.

1.3 Additional layers of complexity

Two additional features of crisis situations can generate further complexity: the inherent uncertainty in a crisis; and the race against the clock. A crisis situation is by nature uncertain. Although most crises possess some common features, each crisis situation is essentially unique and presents contingencies that could not have been anticipated or dealt with ex-ante. In addition, the effects of crisis management authorities' decisions are also uncertain, since in most cases, there is no real precedent that would allow an assessment of the potential consequences. As a result, a certain degree of discretion must be left to the authorities. Crisis management is also a race against the clock. A bad situation can very quickly deteriorate, due to the high leverage of banks and the ability of depositors to withdraw their deposits. Decisions must be taken very rapidly to restore confidence and to avoid wide-scale bank runs and disruptions in the financial sector.

Box 1 – Crisis resolution mechanisms

Potential policy responses to banking crises are multiple. As argued by Dewatripont and Tirole (1994), the policy response to an imminent bank failure affects the incentives and behaviour of lenders, potential lenders, bank management and crisis management authorities. One may classify policies according to whether they represent private sector solutions, liquidity support measures, public intervention tools, or the winding-down of troubled institutions.⁽¹⁾ Many factors, including the critical functions performed by the institution, expected costs, the legislative framework, political considerations, the cross-border character of the ailing bank will influence the chosen solution.

(1) See e.g. Economic and Financial Committee (2000).



Private sector solutions:

Two kinds of private sector solutions can be distinguished:

The first relates to predetermined institutional mechanisms, such as for instance:

Privately funded mechanisms ensuring the business continuity of critical functions: Institutions performing some functions that are critical to the stability of the financial system may be induced to consider the establishment of a legally isolated entity that would be capable of taking over the critical functions if a crisis emerges. This entity could be, e.g. a dormant bank. For instance, in the US, the Working Group on NewBank Implementation (2005) is working on the conditions to implement a newly created company to clear and settle US government bonds and to facilitate tri-party repurchase agreements for the sudden and involuntary exit of one of the two US clearing banks. Important challenges may be associated with the protection of critical functions. Bankruptcy law may need to be modified and operational issues need to be carefully studied. Privately funded mechanisms present the advantage of reducing moral hazard, since they allow an institution to go bankrupt while ensuring the business continuity of the critical functions it operates.

The Liquidity Consortium Bank Mechanism: Liquidity Consortium banks are private limited companies in which all major domestic banking associations, as well as the central bank, participate. The objective of a liquidity consortium bank is to provide liquidity assistance to solvent banks that would need it, in order to secure the payment of their transactions. To the best of our knowledge, a liquidity consortium bank exists only in Germany (Liquiditäts-Konsortialbank).

Predetermined institutional mechanisms are generally tailor-made instruments designed to address specific circumstances and are thus highly dependent upon the environment in which they are implemented.

The second kind of private sector solution relates to ad hoc measures, in which authorities may want to or may be asked to act as “powerful brokers”, such as e.g.:

Capital injection by shareholders or external parties: Supervisory authorities will call for a capital injection when a bank is undercapitalized. When, despite this call, capital requirements can not be met, more drastic solutions may be contemplated.

Mobilization of less liquid collateral and refunding by a bank in the markets: An illiquid bank can obtain liquidity through the mobilization of less liquid collateral and the refunding by a bank, or on the market. If, however, an illiquid bank fails to obtain liquidity through these channels, authorities may act as a powerful broker to initiate a solution in which liquidity is provided by a consortium of banks. This consortium would be an ex-post mechanism, while mechanisms similar to the Liquiditäts-Konsortialbank mentioned above are ex-ante mechanisms.

Restructuring of debts: It may be more profitable for creditors to accept a haircut on their debt, imposed by crisis management authorities or determined by collective renegotiation, than outright liquidation.

Acquisition (of parts) of the institution: Merging the ailing bank with a sound bank allows continuation of business while potentially minimizing the use of public funds. However, this type of private sector solution is not always possible for large banks because of excessive concentration in the banking sector, or because of the absence of candidate acquirers for a complex or very large ailing bank.



Liquidity Support Measures:

Emergency liquidity assistance (ELA) is the responsibility of the central bank, which can decide to provide ELA either to an individual institution, in the Bagehot (1873) view, or to the entire market.

In the Eurosystem, the provision of ELA is primarily a national responsibility. Consequently, costs and risks resulting from ELA are borne at the national level. Mechanisms ensuring adequate flows of information between national authorities and the ECB have been set up to ensure that any potential liquidity impact can be managed in a way consistent with the monetary policy stance and to ensure that any cross-border implications can be dealt with by the competent authorities.

Public Intervention:

In exceptional circumstances, governments can intervene to support an ailing bank, to recapitalize it or to nationalize it to eventually resell it, after restructuring, in part or as a whole at an acceptable price. These operations may require some kinds of government guarantees, loans or transfers, potentially accompanied by changes in management. In more complex situations, new structures, such as a bridge bank or an asset management company (a hospital bank) may be set up:

Bridge Bank: Hoggarth et al. (2004) describe the mechanism of the bridge bank. The ailing bank is closed by the chartering authority and is liquidated. A bridge bank, controlled by the liquidator, is set up to permit the restructuring and sale to a private institution. The bridge bank represents a form of temporary state-ownership that allows to guarantee business continuity.

Hospital Bank: The setting-up of a bridge bank can be combined with the setting-up of a separate state-owned hospital bank, to which all bad loans are transferred (see e.g. Mitchell, 2001 and Bonin and Wachtel, 2004)

In the E.U., any public intervention must comply with E.U. legislation on State aid and, in case of intervention of the central bank, with Article 101 of the Treaty Establishing the European Community which prevents any form of monetary financing of faltering banks.

Winding Down:

As suggested by the Economic and Financial Committee (2000), in many cases, the liquidation of the ailing bank will be the preferred solution.

2. The cross-border dimension: an additional layer of complexity

2.1 Assessing the cross-border character of banks

Each layer of complexity identified in Section 1 is likely to become more difficult to manage in a cross-border setting. Before analysing the additional sources of complexity in a cross-border context, we first provide evidence regarding the cross-border nature of several of the largest banks in Europe.

The number of important cross-border banking groups in Europe is limited, probably at between 20 and 40 institutions (see e.g. Schoenmaker and Oosterloo, 2005). However, since most of these banks are very large, a severe stress affecting one of these institutions could have important knock-on effects on the economies of several countries. Table 1 presents a number of potential indicators of banks' internationalization for some large banks in selected countries. The data in this table come from publicly available sources, principally banks' annual reports. Since all banks do not report the values of each variable, the table is incomplete.

TABLE 1 MEASURES OF FINANCIAL GROUPS INTERNATIONALIZATION
(Year 2003)

	Percentage of employees in domestic country	Percentage of net income generated in domestic country	Percentage of deposits located in domestic country (excluding interbank)	Percentage of assets located in domestic country	Percentage loans located in domestic country (excluding interbank)	Total assets (billion USD)	Total assets as a percentage of country GDP	Total assets in domestic country as a percentage of country GDP
Large financial groups in selected small EU member states								
Belgium								
Dexia Group	63.7	47.3				441.9	150	
Fortis Group	49.4	40.8 ⁽¹⁾	55.4 ⁽²⁾	58.7	36.5	535.5	181	106
KBC Group	39.9		52.9	37.8 ⁽³⁾	48.2	284.9	96	36
Netherlands								
ABN Amro Holding NV	28.2		45.8	36.2 ⁽⁴⁾	58.8	667.6	141	51
ING Group	29.6	42.5 ⁽⁵⁾	33.6	33.2 ⁽⁴⁾	46.2	684.0	144	48
Rabobank Group	87.5				80.0	509.4	107	
Sweden								
Nordea Bank AB	26.1				29.7	331.1	131	
Large financial groups in selected large EU member states								
France								
BNP Paribas	54.7	55.1		40.9		989.0	58	24
Groupe Crédit Agricole SA	70.0	67.7			50.8	1,105.4	64	
Société Générale Group	50.0	54.5			60.0	681.2	40	
Germany								
Commerzbank Group	77.4		92.4		71.4	481.9	22	
Deutsche Bank	41.4	39.8		24.5	57.0	1,014.8	47	11
Dresdner Bank Group	78.5	83.1		89.7	40.7	602.5	28	25
HypoVereinsbank AG		87.9				605.5	28	
United Kingdom								
Barclays Group	76.5	74.8	71.6 ⁽⁸⁾	74.7		791.3	46	34
HBOS						650.7	38	
HSBC Holdings	22.1	23.5 ⁽⁹⁾		< 42.6		1,034.2	60	26
Royal Bank of Scotland Group			73.9	69.4 ⁽⁴⁾	72.8	806.2	47	32
Large financial groups in selected non EU member states								
Switzerland								
Credit Suisse Group		38.3 ⁽⁶⁾	46.2	19.8 ⁽⁴⁾	66.5	777.8	337	67
UBS AG	38.5	36.4 ⁽⁷⁾		10.9		1,120.5	486	53
USA								
Bank of America Corp		94.6	82.9	94.3		736.4	7	7
Citigroup Inc	50.3	47.0 ⁽¹⁰⁾	33.6	between 62 and 67	57.9	1,264.0	12	8
JP Morgan Chase & Co		52.3	75.0 ⁽¹¹⁾	76.9 ⁽⁴⁾	90.7	770.9	7	6

Sources: The Banker, OECD, Financial Groups' annual reports.

(1) Total revenues net of interest expenses.

(2) Amount owed to customers.

(3) Banking.

(4) Interest earnings assets only.

(5) Operating profit before tax.

(6) Net interest income.

(7) Total operating income.

(8) Customer accounts including trading business.

(9) Profit on ordinary activities before tax excluding goodwill amortization.

(10) Including Canada.

(11) Including interbank.

The variables in the first five columns of the table propose a set of alternative measures of internationalization. These variables capture different dimensions of the cross-border character of banks, such as the internationalization of the workforce, of revenues, and of assets and liabilities. Taken individually, no single indicator provides a perfect measure of the degree of internationalization of the institution. Taken together, however, the group of variables gives a better idea of the degree of internationalization of each bank, as it reflects differing dimensions of internationalization. Additional variables, such as the organisational structure of the group (branch vs. subsidiaries), data relating to the countries in which the group has significant operations, or data on links with foreign banks, etc., would allow to gain a more accurate picture of some of the risks that could be associated with internationalization, especially as such data could provide insights on banks exposures in individual countries and on the potential channels through which a problem in one country could affect a bank in another country.

Because of their international activities, cross-border banks are usually large. The three last columns of the table allow comparisons of the sizes of large banks relative to the sizes of their home countries. The GDP of the home country is compared to both the total assets and the domestic assets of each large institution. Not surprisingly, total assets represent a larger percentage of GDP in small countries than in large countries. For instance, total assets of UBS AG represent 486 p.c. of Switzerland's GDP while those of BNP Paribas represent 58 p.c. of the GDP in France and those of Citigroup Inc. 12 p.c. of US GDP. The picture is slightly different when we consider domestic assets only. Although domestic assets also represent a larger share of the GDP in small countries, the difference between large and small countries tends to reduce. For instance, domestic assets of UBS AG represent 53 p.c. of its home country's GDP vs 24 p.c. for BNP Paribas. The relative importance of cross-border banks for large and small countries is dealt with in sub-section 2.5.

2.2 Allocation of responsibilities in a cross-border context

The legal structure of a bank influences the supervisory and, to some extent, the crisis management responsibilities of the different national authorities. Cross-border banks can choose between two legal forms of organisation: subsidiaries or branches. Foreign subsidiaries are legally independent entities owned by their parent company. Theoretically, limited liability establishes a legal firewall shielding the parent company from losses in its subsidiaries and vice-versa. Foreign branches, on the other

TABLE 2 TRADITIONAL VIEW OF HOST-COUNTRY RESPONSIBILITY FOR FOREIGN-OWNED BRANCHES AND SUBSIDIARY BANKS IN EUROPE

Host-country authorities are responsible for	Subsidiary banks	Branches
Information sharing	Home/host responsibility	Home/host responsibility
Solvency assessment (supervisory authorities)	X	
Liquidity support (central bank)	X	X
Capital support (political authorities / Ministry of Finance)	X	
Deposit guarantee (deposit guarantee fund)	X	X ⁽¹⁾
Winding down (liquidator)	X	

Source: Adapted from Borchgrevink and Moe (2004).

(1) In the EEA area, branches of credit institutions based in another EEA state are entitled to purchase additional cover in the host country's deposit guarantee fund if the host country's guarantee fund has a better coverage than the home-country fund of which the branch is a member.

hand, are operating entities which are an integral part of the parent company, in that they do not have a separate legal status. The parent company is thus liable for the obligations of its foreign branches. In the case of a crisis, it may thus be easier to organize the disposal of a subsidiary than the sale of a branch.

In terms of supervisory responsibilities, home authorities have responsibility for the supervision of foreign branches (with the important exception of the supervision of liquidity which is the responsibility of host authorities⁽¹⁾), and host authorities have responsibility for the supervision of the subsidiaries they host. Although cross-border crisis management responsibilities are not clearly defined, current perceptions of these responsibilities tend to follow from the supervisory responsibilities. For instance, the host country is considered to be responsible for the liquidity assistance of both branches and subsidiaries it hosts. On the other hand, the home country is responsible for deposit insurance coverage of depositors in foreign branches. A foreign branch may however purchase "top-off" deposit insurance coverage when the coverage offered in the host country exceeds that in the home

(1) As put forward by the Basel Concordat, (Committee on Banking Regulations and Supervisory Practices, 1975), the rationale for entrusting host authorities with liquidity supervision is that "in managing their liquidity foreign banking establishments rely heavily on local practices and comply with local regulations, including those established for monetary purposes". This includes of course the use of local currencies.

country. The host country is responsible for deposit insurance coverage of foreign subsidiaries. Table 2 summarizes the traditional views regarding home-host responsibilities in case of crisis management.

2.3 Public policy objectives and conflicting interests in the cross-border context

The difficulty of defining public policy objectives at the national level in domestic crises was discussed in Section 1. Not surprisingly, adding the international dimension to crisis management makes identification of a single objective more difficult, even in the case where the focus is exclusively on financial stability and when a single authority is in charge of crisis management in each country. Indeed, as each national authority often has a mandate to minimize the negative externalities and the use of public funds at the national level, the objectives of the differing authorities may end up conflicting in some crisis situations, especially if handling externalities in one country would require public intervention in another country.

A classic example in which the objectives of national authorities may differ is that of a bank which is not systemically important in the home country but which nevertheless has a systemically important branch in a host country⁽¹⁾. Imagine that this bank fails. If no private sector solution emerges, the home authorities may be reluctant to use domestic taxpayers' money to bail out a bank that is not of systemic importance. On the other hand, whereas systemic concerns might render host authorities more favourably disposed to using public funds to resolve the crisis, they might not accept to allocate public funds to bail out the home country bank. As long as the sharing of the costs is not predetermined, and consequently, as long as interests between national authorities diverge, authorities may end up acting non-cooperatively.

(1) This example, although frequently cited, is not likely to materialise as the number of systemic branches is limited. Indeed, systemic establishments are preferably incorporated as subsidiaries than as branches.

However, as conflicts of interest are exacerbated by the use of public funds, prespecified cross-border mechanisms that would rely on private funds (see Box 1) and that would ensure the business continuity of systemically important functions could help to alleviate these conflicts. Yet, implementing such mechanisms in a cross-border setting would likely be more challenging than implementing them in a purely domestic context.

In addition to this classic example, there are other situations in which the interests of different national authorities could diverge. Indeed, it is not even necessary for a bank in one country to have an establishment in a foreign country in order for its failure to trigger negative externalities in the foreign country. For example, the failure of a purely domestic bank performing critical functions for some foreign banks can generate negative externalities in foreign countries. Handling these negative externalities would likely necessitate intervention of the home authorities of the bank. Yet, if the mandate of these authorities is to find the least-cost resolution mechanism while minimizing domestic negative externalities, the authorities may simply want to liquidate the bank.

An additional source of complexity is specific to the institutional architecture in the EMU. The primary objective of the Eurosystem is the maintenance of price stability. At the same time, the Eurosystem also aims to safeguard financial stability and to contribute to the smooth conduct of policies pursued by the competent national authorities relating to prudential supervision of credit institutions. Yet, potential tension could arise between these objectives. They are, however, not addressed in the present article (see e.g. Lamfalussy, 2004).

In brief, the purely national mandates of authorities can lead to conflicts of interest between national authorities. These conflicting interests introduce considerations of non-cooperative game theory. Box 2 presents an short overview of the academic literature related to such conflicts.

Box 2 – Conflicts of interest in supervision and crisis management of cross-border banks: an overview of the literature

This box reviews the literature on potential conflicts of interest between supervisors or between crisis management authorities in a cross-border setting. Four main topics are identified: (1) Race (to the bottom or to the top) with regards to capital requirements; (2) Withholding of information by authorities; (3) Excessive forbearance in closure policy; and (4) Inefficiency of improvised co-operation when public funds are needed.



(1) Race (to the bottom or to the top) with regards to capital requirements

Because they have purely domestic mandates, nationally based, or “decentralised” supervisors may fail to internalise cross-border effects of their actions. If they fail to internalise the positive effects of their actions, nationally based supervisors will choose lower capital requirements than would a single, or a “centralised” supervisor of cross-border banks. For example, Dell’Ariccia and Marquez (2006) study a situation in which capital requirements are binding; therefore, an increase in the capital requirements in a given country reduces the loans granted by banks from that country. The reduction of loans by domestic banks reduces competition for foreign banks. The reduction in loans by domestic banks also raises the marginal return of the extra loans granted by competing foreign banks in that country, as foreign banks are able to charge a higher interest rate on the residual demand. This increases the average return to lending of foreign banks, increasing the return to monitoring. Indeed, banks choose the level of monitoring. The model assumes that monitoring costs are increasing and convex in the probability of success of loans. The optimal degree of monitoring by the bank in a given country decreases with the quantity of loans granted (due to decreasing marginal returns of loans), in both the home and the foreign countries in which the bank operates. Hence, if the capital adequacy ratio increases in a given country, loans in this country will fall, and the level of monitoring in foreign countries will rise. A “centralised”, or single, regulator would internalise this positive externality, whereas decentralised, nationally-based regulators will not. Decentralised supervisors, because they have an incentive to lower capital requirements to provide the banks they supervise with an advantage over foreign banks, may then engage in a “race to the bottom”.

On the other hand, if higher capital requirements in one country have negative effects in other countries, then decentralised supervisors will fail to internalise these negative externalities, and they will set higher capital requirements than would a centralised supervisor. Harr and Rønde (2003) analyse this type of case. In their model an increase in the capital requirements in the home country reduces the welfare of home banks’ shareholders, both those located in the home country and those located in foreign countries. The reduction in shareholder welfare is due to the fact that capital is costly. A decentralised supervisor takes account of this reduction when he maximises his welfare function. Yet, since the decentralised home supervisor does not take account of foreign shareholders’ welfare reduction, he may set higher capital requirements than the level that would be socially optimal when the foreign shareholders’ welfare is taken into account.

In reality, to the extent that Basel 2 imposes a certain amount of leveling of capital requirements across countries, one might wonder whether authorities could in practice engage in the “races” studied in the above papers. Actually, the ideas of these models could still apply in the frame of Pillar 2 of the Basel Accord, since Pillar 2 allows authorities to exercise a certain degree of discretion in imposing capital requirements in response to the assessment of certain risks not explicitly taken into account in the capital formulas of Pillar I.

(2) Withholding of information by authorities

Because information plays a crucial role in crisis management, domestic authorities may withhold information in the case of crisis in order to protect their own domestic interests. Information-sharing mechanisms between domestic authorities in normal times, however, may be argued to reduce asymmetries of information in a crisis involving a cross-border bank. Ex-ante information sharing, however, will only occur if authorities expect a low level of conflicts of interest in crisis times, or if authorities in other countries are believed to be unlikely to exploit their information opportunistically in the case of crisis. In other words, the benefits of sharing information today must exceed the potential costs for domestic authorities resulting from dealing with better informed counterparts in foreign countries in crisis times. The level of information sharing is thus endogenously determined. For instance, Holthausen and Rønde (2003) study the information sharing incentives just preceding bank closure. They conclude that even if the appropriate formal channels for the exchange of information are in place, the current regulatory framework might not work well if the interests of the supervisors in different countries are very different. National supervisors are assumed to maximize the welfare of their own country, disregarding welfare of other countries.



Supervisors in different countries will not always agree on whether to close an ailing bank because, generally, the two countries will be affected differently by the closure decision. The national supervisors thus have asymmetric interests resulting from differences in their own exposures, in the exposure of domestic stakeholders, in the importance of the bank in each country, in the impact on their deposit insurance scheme, etc. Consequently, as incentives to share information are not perfectly aligned at the point of closure of a bank, none of the supervisory authorities will benefit from perfect information sharing.

(3) Excessive forbearance in closure policy

Acharya (2003) studies another form of race to the bottom by supervisory authorities, i.e. a race to forbearance in the decision to close, to liquidate or to withdraw the banking license of a bank. In this model, a greater forbearance in one country constitutes a competitive edge for the banks located in that country. In particular, banks located in that country will be able to invest in more risky assets. Acharya (2003) observes that if capital requirements are constrained to be the same across countries, then supervisory authorities may engage in a race to forbearance, because of the competitive edge that is obtained.

Calzolari and Loranth (2004) study a model in which a supervisor faces a trade-off between intervening early and closing a bank – which generates a sure cost but which may prove to be unnecessary if the bank could have survived – and waiting, which may generate a substantially higher cost if the bank is insolvent and if its insolvency worsens over time. Differences in banks' organisational structures (branches versus subsidiaries) lead to differences in the likelihood of intervention by foreign and domestic regulators. These differences of regulators in the tendency to intervene in troubled banks derive from the differences in the foreign and home regulators' deposit insurance liabilities according to whether the bank is organised via subsidiaries or branches. In addition, the availability of assets from the parent unit to bail out the foreign unit will depend upon whether that unit is a branch or a subsidiary. When the bank is organised via subsidiaries, the home regulator will have the tendency to intervene earlier in the home unit than the foreign regulator in the foreign unit because the home regulator benefits from the residual profits of the foreign subsidiary but is protected from losses of the subsidiary. The home regulator will intervene less often when the bank is organised via branches because the supervisor has to repay foreign depositors.

(4) Inefficiency of improvised co-operation when public funds are needed

In the model of Freixas (2003), a bank bailout is considered to be a public good, and improvised co-operation will lead to an inefficient level of bail out. When co-operation is improvised, different countries' authorities must meet to find out how much they are willing to contribute to a bail out. If the amount they are willing to contribute is greater than the costs of assistance, the bank is bailed out. This game may in fact have a multiplicity of equilibria. In one of them, the bank is never bailed out if the benefits of the bailout in at least one country do not exceed the total costs in the home and host countries; i.e., if no individual country is ready to finance the bail out by itself. This is obviously inefficient; improvised cooperation will lead to under-provision of the public good. Co-ordination is also possible. A single, centralised authority may be designated to collect the benefits and costs estimates of each individual country. Each country will have the incentive to reveal its benefits and costs truthfully if the information that is obtained is only used to reach a bailout decision but cannot be used in the cost sharing rule. Some incentive-compatible mechanisms can be implemented (e.g., the Groves-d'Aspremont-Gerard-Varet incentive compatible mechanism), in which there is no room for ex-post negotiation or for information manipulation.

2.4 Conflicting national legal frameworks

Even in the absence of conflicts of interest between national authorities, the resolution of a cross-border crisis will be more complex than the resolution of a purely domestic crisis because national legal frameworks may differ or, worse, may even be contradictory. In this section, we present a few illustrations of potential obstacles resulting from conflicting legal frameworks.

Competition laws in a country may constitute an obstacle to the resolution of a cross-border crisis. In some cases the proposed resolution mechanism – for instance a takeover of the ailing bank by a sound bank – may be forbidden by a country's legislation, because the proposed solution would result in an unacceptable level of concentration in the banking sector. Although arrangements may be found between national authorities to overcome this problem – such as, for instance, a partial takeover or the sale of the entity in the concentrated country to another participant – these problems are likely to take time to resolve.

Another legal area which may impede a swift resolution process is that of differing insolvency arrangements across countries. (See Box 3 for an illustration of the BCCI case, which spanned countries outside of the European Union). In order to overcome these problems within the EU, several issues concerning insolvency arrangements have been addressed by the European Winding-up directive (see e.g. Deguée, 2001). This directive states that, in the EU, the insolvency framework of the home country will be used for cross-border banks organised via branches. The home authority is thus given the exclusive right to initiate the reorganisation measures and winding-up proceedings, using its national legislation on the winding up of financial institutions. Although the Winding-up directive facilitates the legal treatment of cross-border insolvencies, it clearly does not solve the potential conflicts of interest between national authorities mentioned in Section 2.3.

Many questions remain with regard to the allocation of powers between national authorities when dealing with the insolvency of a cross-border banking group organised via subsidiaries. For instance, in a situation in which the parent company of an ailing foreign subsidiary decides to liquidate it, could the authorities in the country hosting the subsidiary force the parent company to recapitalize it instead? Could the home authorities oppose a recapitalization that would weaken the parent structure? Similarly, if the parent company is in trouble but the subsidiary is sound, could the parent company proceed to a “fire sale” of the sound systemic subsidiary? Could the authorities in the country hosting the subsidiary oppose such a liquidation, even in the absence of buyers at a fair price?

Two issues actually underlie these questions: (1) the “source of strength” doctrine and the associated relationships between parent company and subsidiaries; and (2) the feasibility of transferring assets within a group organized via subsidiaries. The source of strength doctrine requires that a bank holding company uses the resources in its banking and non-banking subsidiaries to support a distressed subsidiary bank (see e.g. Ashcraft, 2004). In the U.S., the Federal Reserve applies the source of strength doctrine by assuming that it is an unsafe and unsound banking practice for a parent holding company to fail to act as a source of strength to a troubled banking subsidiary when resources are available within the parent company. In addition, the U.S. Financial Institutions Reform, Recovery and Enforcement Act of 1989 gives the FDIC the authority to charge off any expected losses from a failing banking subsidiary to the capital of the non-failing affiliate banks within the group. Yet, the application of this doctrine, even in the US, has proven to be problematic. For instance, in two cases (the MCorp and the BNEC cases), the Federal Reserve faced legal opposition to the application of the source of strength doctrine. Although one case made it to the U.S. Supreme Court, the substantive issue was never resolved, and both cases were finally settled out of court (see e.g. Bliss, 2005). In summary, the application of this principle by an authority in a cross-border setting is likely to generate both conflicts of interest between national authorities and long legal disputes.

A necessary condition for applying the source of strength doctrine is that assets be easily transferable between all units of a group, including the parent and all the subsidiaries. However, as subsidiaries are legally incorporated entities and as the subsidiaries in a given group have differing stakeholders and creditors, the management of each subsidiary is generally required by law to protect the interests of the particular company they manage. Consequently, transfers within a group are typically subject to the arm's-length principle, and detrimental transfers may eventually be ruled (perhaps retroactively) to be null and void. In addition, company law often prevents the group-wide interest from prevailing negatively on the individual company interest. Thus, financial authorities, because of their national mandates, may have the duty to prevent any detrimental transfers from entities under their supervision, and they might be held liable if they do not, even if the “detrimental” transfer has been orchestrated in co-operation with foreign authorities. Consequently, whereas the principle of group solidarity is often taken for granted, this principle may not actually be applied in practice if the banking group faces severe problems.

Box 3 – Conflicting insolvency arrangements: a mortality review of BCCI

This box illustrates how cross-country differences in insolvency arrangements could influence the management of a crisis of a cross-border bank⁽¹⁾ (see e.g. Contact Group on the Legal and Institutional Underpinnings of the International Financial System, 2002). Countries may differ on several fundamental points. These conflicting principles create uncertainty regarding the final outcome of a crisis resolution process.

A first crucial difference is linked to the specificity of the financial sector. Some countries have designed insolvency arrangements that are specific to banks and that thus take account of bank specificity. However, in other countries, the legislative framework on insolvency is common to all firms. In addition, each legislative framework is based on one of two conflicting principles:

- the principle of unity of bankruptcy: in which one competent court – namely the court of the country in which the bank is headquartered – decides on the bankruptcy of the debtor;
- the principle of plurality of territory: in which the bankruptcy proceeding is effective only in the country in which it is initiated.

Other fundamental principles settling insolvency arrangements in national legislation can be conflicting:

- the single entity principle: in which all assets of the bank are encompassed in the liquidation (worldwide creditors);
- the separate entity principle: in which each entity is considered as a separate bank.

Besides these broad principles, specific legal clauses may be conflicting. For instance, the right to set-off claims in two different jurisdictions is likely to be different. Depending on the jurisdiction, set-off may be forbidden, partially allowed or totally allowed. If it is partially allowed, some conditions may be required for bilateral set-off to be authorised. Conditions may include that claims are denominated in the same currency, are booked in the same legal entity, in the same country or have the same maturity.

A mortality review of BCCI illustrates the uncertainty that results from the lack of coordination when regulators confront different insolvency laws (see e.g. Basel Committee on Banking Supervision, 1992 and Herring 2003). BCCI banking activities were composed of a bank incorporated in the Cayman Islands (BCCI Overseas) and a bank incorporated in Luxembourg (BCCI SA). The non-bank holding company heading these two banks was incorporated in Luxembourg. Although BCCI SA was supervised in Luxembourg, its activities were conducted in 15 countries through 47 different branches and 2 subsidiaries. BCCI Overseas operated in 28 countries through 63 branches. The operational headquarters of BCCI Overseas were located in the United Kingdom. The other subsidiaries and affiliates of BCCI Holdings operated 255 banking offices in about 30 countries. Subsequent to the fraud in 1991, authorities in the Cayman Islands, Luxembourg, the UK and the US secured control of the assets of BCCI. Yet, conflicts in national insolvency arrangements made the liquidation of BCCI exceedingly complex.

First, the US did not apply general bankruptcy laws to banks. In addition, foreign bank insolvencies were ruled by their own legal framework, which was different from both the framework for firm bankruptcy and for domestic bank insolvency (see e.g. Schwarcz, 2005). On the other hand, the same liquidation law was applied to banks as to other firms in the UK. A third regime was applied in Luxembourg, in which a court had to decide on a case-by-case basis whether to apply general bankruptcy laws or specific rules.

(1) Note that the UNCITRAL model law on cross-border insolvency of 1997 excludes banks from its scope. The problem of conflicting laws may thus be even more acute for banks than for non-financial firms.



Not only did the bankruptcy laws applied to the bank differed across countries, but also did the fundamental principles underlying these different codes. While the US applied a separate entity principle to the liquidation of US branches of foreign banks⁽¹⁾, Luxembourg and the UK insolvency arrangements relied on a single entity principle. Consequently, in the US, a preference was given to domestic claims as the creditors of the US branch were repaid from the assets of the US branch in the United States or worldwide. Creditors from other offices of the bank, on the other hand, had access to the remaining assets only when creditors of the domestic branch had been indemnified. Luxembourg and the UK insolvency arrangements considered, in contrast, that the bank and all its foreign branches belonged to a single entity. Therefore, no geographical class of creditors were given preference.

As this brief overview shows, a lack of convergence of insolvency agreements may lead to unequal and conflicting treatment of similar creditors. This opens the door to long legal procedures, which are justified by the legal uncertainty surrounding the insolvency arrangements.

(1) A US chartered bank is liquidated using the single entity principle.

2.5 Complexity and size of banking group

Even if national authorities' interests were perfectly aligned and legal frameworks compatible, the operational structure of banks might create difficulties in the management of a crisis. Indeed, because the operational structure of a bank could potentially distort the capacity of authorities to effectively exert their powers, it may introduce a divergence between the formal power of authorities and their real power. The choice of operational structure is thus not neutral from a crisis management point of view. In particular two types of structures may cause distortions.

First, some banking groups organize their operations along business lines (e.g. retail banking, asset management, merchant banking, etc.), which may cross national borders. Such organisation may result in a transfer of decision power from the national entities of the group to a centralised business-line manager, who will not necessarily be in the home country. Consequently, it may be more difficult for nationally-mandated (i.e., "decentralised") authorities to manage a crisis, as the cross-border integration of business line management may increase the risk of intra-group, cross-border contagion.

TABLE 3 FITCH SUPPORT RATING: LARGE COUNTRIES VERSUS SMALL COUNTRIES

Rating	Number of banks		Percentage	
	Large countries	Small countries	Large countries	Small countries
1. Extremely high probability of external support	76	44	52.1	68.8
2. High probability of external support	20	10	13.7	15.6
3. Moderate probability of support	40	5	27.4	7.8
4. Limited probability of support	3	2	2.1	3.1
5. External support, although possible, cannot be relied upon ..	7	3	4.8	4.7
Total	146	64	100.0	100.0

Source: Bankscope – April 2006 + own calculation.

Secondly, some banking groups have begun centralising key operational or risk management functions. When a banking group centralises operational functions, such as back office operations, there is a risk that the authorities hosting a subsidiary of the group will become unable to supervise these functions. In addition, they may be unable to assist a sound subsidiary if the parent company that houses the key operational functions goes bankrupt. As a response to such a contingency, authorities are putting in place a policy to manage the outsourcing risk arising from the centralisation of key activities in parent companies⁽¹⁾.

The centralisation of key risk management functions, such as liquidity risk management, in a banking group raises additional challenges. First, it may question the effectiveness of host country supervision of liquidity risk in branches and subsidiaries. Despite the fact that the authorities hosting foreign branches and subsidiaries are legally responsible for the liquidity of these institutions, they may not be able to control how the liquidity is managed in the parent company. In addition, centralised liquidity management may weaken the legal protections arising from the subsidiary structure, as it may create features that make the group resemble one with a branch structure.

Regarding the problems linked to institution size discussed in Section 1, an additional potential issue that arises in a cross-border setting may make the development of cross-border arrangements for crisis management more complex. Namely, large cross-border banks established in small countries may potentially suffer from a handicap that is sometimes referred to as “too-big-to-save”. The comparison across small and large countries in Table 1, of the share of GDP accounted for by the assets of banks, suggests that small countries’ authorities who would like to financially support some of their large banks in some extreme tail event might be in a challenging situation⁽²⁾. This putative handicap, however, depends upon the extent to which markets price moral hazard associated with the ambiguity surrounding potential support in large and small countries. Yet, rating agencies (and markets) do not seem to consider the issue of the size of large banks in small countries as particularly relevant. For example, the Fitch Support Rating represents a judgement by Fitch of a potential supporter’s propensity to provide support

to an ailing bank and of its ability to provide the support. The potential supporter can be a sovereign state or an institutional owner. A quick examination of Fitch Support Ratings, shown in Table 3, suggests that the probability of a bank receiving external support in small European countries is not fundamentally different from the probability of receiving external support in large European countries. These data thus appear to be more consistent with the view that large banks in small countries are more likely to be too-big-to-fail than too-big-to-save⁽³⁾. Rime (2005) presents similar results. He bases his analysis on issuer ratings (Moody’s and Fitch) and concludes that rating agencies do incorporate the too-big-to-fail doctrine in their ratings but do not consider the potential too-big-to-save issue. Nevertheless, the fact that rating agencies currently do not seem to take account of potential too-big-to-save effects does not close the debate on large banks and country size. Indeed, in a crisis involving a large cross-border bank, tensions may surface between countries with asymmetric financial capacities. This constitutes an additional issue that renders cross-border crisis management complex.

Countries with large banks have a vested interest in limiting the moral hazard associated with the ambiguity surrounding the potential public support. Interestingly, Fitch support ratings appear, at least at first sight, to be determined both by geographical features and by banks’ activities. For instance, Fitch judges that large investment banking groups, which do not collect retail deposits, are unlikely to enjoy external support (see Table 4). Most of these large investment banks indeed receive a rating of 5, although some of them get a 4. Fitch, on the other hand, assumes that the (foreign) investment banking affiliates of large groups can rely on the support of their parent company, and these affiliates are indeed rated with a 1 (e.g. Lehman Brothers Inc or Citibank International Plc). Commercial banks in continental Europe, on the other hand, all receive very high support ratings. In the US and in the UK, however, commercial banks receive low support ratings, except if they can rely on their parent’s support. The ratings in Table 4 provide support for the idea that although public funds may be used to indemnify retail depositors, public funds are less likely to be used to assist ailing banks which are not funded by retail deposits.

Note that the issuance of support ratings by rating agencies reflects the idea that market players take account of potential support by authorities. Rating agencies are in the process of refining their methodologies to assess the probability of support. Moody’s, for instance, is reviewing its methodology for banks rating and published in October 2005 a request for comments on a proposal to incorporate joint-default analysis into their banks’ ratings,

(1) In Belgium, the CBFA issued a Circular (Circular PPB 2004/5) on sound practices with regards to the outsourcing by financial institutions in 2004. See also e.g. Kaufman (2004) or Reserve Bank of New-Zealand (2004) for the specificities of the policy on outsourcing in New-Zealand.

(2) This is a very complex issue. Indeed, even if the banking sector of a country is exclusively composed of small banks, the country may encounter difficulties if these banks are strongly interrelated, causing a high degree of contagion. In addition, a mere look at assets is not sufficient as it does not give an indication of the potential size of risks.

(3) Admittedly, the support rating is not a perfect measure, as the potential supporter is not necessarily a sovereign state. Also, we have not controlled for other variables which might differentiate the banking sectors in small and large countries.

TABLE 4 FITCH SUPPORT RATING:
SELECTED SAMPLE OF BANKS

Bank Name	Country Name	FitchRatings Support
Investment banks		
Macquarie Bank Ltd	AU	4
Nomura Securities Co, Ltd	JP	4
Bank Morgan Stanley AG	CH	1
Citibank International Plc	GB	1
Standard Bank Plc	GB	2
Bear Stearns Companies Inc	US	5
Charles Schwab Corporation	US	5
Deutsche Bank Securities Inc	US	1
Goldman Sachs Group, Inc	US	5
Lehman Brothers Holdings Inc	US	5
Lehman Brothers Inc	US	1
Merrill Lynch & Co, Inc	US	5
Morgan Stanley	US	5
Commercial banks and savings banks		
Dexia	BE	1
Fortis	BE	1
KBC Bank NV	BE	2
Banque AGF	FR	1
BNP Paribas	FR	1
Dexia Crédit Local SA	FR	1
Société Générale	FR	1
Bayerische Hypo-und Vereinsbank AG	DE	1
Commerzbank AG	DE	1
Deutsche Bank AG	DE	1
Dresdner Bank AG	DE	1
Capitalia SpA	IT	2
Dexia Banque Internationale à Lux. SA	LU	1
Fortis Banque Luxembourg SA	LU	1
ABN Amro Holding NV	NL	1
Fortis Bank Nederland (Holding) NV	NL	1
ING Bank NV	NL	1
Nordea Bank AB	SE	1
Bank of Scotland	GB	1
Barclays Bank Plc	GB	1
HBOS Plc	GB	5
HSBC Bank Plc	GB	1
HSBC Holdings Plc	GB	5
UBS Limited	GB	1
Bank of America Corporation	US	5
Citigroup Inc	US	5
HSBC Finance Corporation	US	1
HSBC USA Inc	US	1
JP Morgan Chase & Co	US	5
JP Morgan Chase Bank, NA	US	1

Source: Bankscope – April 2006.

Note: The following codes for countries are used:

AU: Australia; BE: Belgium; CH: Switzerland; DE: Germany; FR: France;
GB: United Kingdom; IT: Italy; JP: Japan; LU: Luxembourg; NL: Netherlands;
SE: Sweden; US: United States.

to reflect any form of support⁽¹⁾, including national government support. Rating agencies thus provide information relevant for the pricing of moral hazard⁽²⁾.

2.6 Uncertainty in the cross-border context

Similarly to domestic crises, cross-border crises are characterised by uncertainty and must be managed rapidly to avoid spillover effects. Yet, additional sources of uncertainty arise in a cross-border environment, since players are likely to be imperfectly informed about crisis management procedures in other countries and about the situation of the ailing bank affiliates in those countries. Decisions may be taken less quickly because of the greater challenges relating to coordination of national authorities, communication to the ailing bank, and communication to the markets. In addition, coordination will be rendered more difficult to the extent that crisis management procedures and cost sharing have not been defined ex-ante and also to the extent that interests between authorities diverge.

The additional layers of complexity arising in the context of cross-border crises and highlighted in this section give rise to three challenges for cross-border crisis management:

- (1) to harmonise conflicting laws;
- (2) to reinforce supervisory co-ordination, especially as supervisory co-ordination helps also to reinforce co-ordination in crisis times;
- (3) to identify potential conflicts of interest resulting from national mandates and to design resolution mechanisms that mitigate these conflicts of interest. This also implies reconciling the legal and operational structures of banks with the effective supervisory responsibilities of home and host authorities.

The next section identifies past and current initiatives aimed at meeting these objectives.

(1) The joint-default analysis would be based on a sequential support model, which would assess the parent and the government probability of support (see Moody's, 2005).

(2) O'hara and Shaw (1990) study the consequences on bank equity of the testimony before Congress of the Comptroller of the Currency in 1984. In that statement, the Comptroller of the Currency acknowledged that the 11 largest banks in the US were too-big-to-fail. They find that positive returns for the concerned banks followed that statement. On the other hand, they find negative wealth effect for the remaining banks. The magnitude of these effects depend upon bank solvency and size. Morgan and Stiroh (2005) investigate the bond spreads-ratings relationship. They find a flatter relationship for too-big-to-fail banks, suggesting that investors take account of potential support in bond spreads.

3. Past and current initiatives in cross-border supervision and crisis management.

Sections 1 and 2 have identified crucial issues relating to the management of domestic and cross-border crises, leading to three challenges for improving cross-border crisis management. Improvements resulting from these challenges, however, are not likely to be exclusively focused on crisis management but may concern banking supervision as well, since supervisory arrangements have a direct impact on crisis management and vice-versa. Efforts to date have indeed concentrated almost solely on supervision of cross-border institutions, and few explicit provisions for managing crises of cross-border banks have been put in place. Further improvements could come from the formulation of explicit crisis resolution arrangements. This section briefly reviews several initiatives that have contributed to improving cross-border crisis management and potential directions for future initiatives.

3.1 Harmonizing conflicting laws

A number of European directives have recently been issued which help to reduce conflicts in the EU legislative framework relating to banking supervision and crisis management. Many of these directives have resulted from the Financial Services Action Plan (FSAP). They include the Winding up directive, the Directive on deposit guarantee schemes, the Directive on financial collateral and the Financial conglomerates directive. The European Commission, however, has recently noted that the transposition of Community law resulting from the FSAP is currently too slow.

3.2 Reinforcing supervisory coordination and fostering convergence of supervisory practices

The existing supervisory framework in the EU, established through the European banking Directives and in accordance with the Basel Concordat of 1975, rests on the principles of home country control, of mutual recognition and of a single banking licence. This framework, from which crisis management responsibilities are derived, could not work without some supervisory co-operation.

Indeed, reinforcing supervisory co-operation and fostering convergence in supervisory practices have constituted the cornerstones of past and recent initiatives.

Initiatives to foster supervisory co-operation and co-ordinate practices have been taken at the global level, mainly through the Basel Committee on Banking Supervision (BCBS). In 1990 the BCBS issued recommendations with regard to the exchange of information between supervisors, defining the information needs of the parent authorities, as well as the information needs of the host authorities. More recently, the Concordat has been supplemented with recommendations on minimum standards for the supervision of international banking groups and their cross-border establishments (1992), recommendations on the supervision of cross-border banks (1996) and a consultative document on a revised version of the Core Principles for Effective Banking Supervision (2006). In parallel, the BCBS has also published high-level principles for the cross-border implementation of the New Accord (2003), principles for the home-host recognition of the advanced measurement approach for operational risk capital (2004) and a consultative document on home and host information sharing for effective Basel II Accord implementation (2005).

At the European level, an important role is being played by the Committee of European Banking Supervisors (CEBS), whose mandate is to "advise the European Commission on banking policy issues and promote convergence of supervisory practise across European Union [and] (...) also foster and review common implementation and consistent application of Community legislation" ⁽¹⁾. The range of CEBS initiatives to improve co-operation and convergence of practices includes the following:

- In order to improve **co-operation**, CEBS has recently published guidelines on cooperation between supervisors of EU banking groups and investment firms (CEBS, 2006). These guidelines are devised to promote an efficient supervisory framework for groups that operate in several EU jurisdictions, by enhancing the operational networking of national supervisors. In addition, according to its Charter ⁽²⁾, CEBS is also in the process of improving procedures for information exchanges.
- In order to enhance **convergence of supervisory practices**, CEBS has published a document on the application of the supervisory review process under Pillar 2 of the Basel II Accord. CEBS has also published guidelines setting out a framework to deal with cross-border applications for approval to use the Advanced Measurement Approach and the Internal Rating Based Approach.

(1) See CEBS website: www.c-ebbs.org

(2) CEBS charter mentions that "considering that close co-operation as well as information exchange between regulatory authorities are essential for the successful supervision of the European banking sector and that synergies between banking supervision and central bank oversight should be taken into account, (...) The Committee will develop effective operational network mechanisms to facilitate the exchange of information in normal times and at times of stress and to enhance day-to-day consistent supervision and enforcement in the Single banking Market".

CEBS has also acted as a catalyst in a series of other projects. For instance, CEBS has recently published guidelines on a common reporting framework to be used by credit institutions and investment firms in reporting their solvency ratios to supervisory authorities under the Capital requirements directive (CRD), as well as guidelines for the implementation of the framework for consolidated financial reporting. Harmonisation of reporting also remains one of the objectives of the Commission of the European Communities (2005), which expressed its intention to develop common reporting requirements and potentially common prudential databases by 2009. Indeed, from 2009, all EU banks, insurance undertakings and major investment companies should be able to send one complete reporting package to the competent authority at the consolidated level.

Other bilateral and multilateral initiatives have recently contributed to improving supervisory networks. Authorities in several countries have negotiated bilateral and multilateral Memoranda of Understanding (MoU). The allocation of supervisory responsibilities is sometimes defined in MoU, which may include practical considerations regarding the exchange of information, joint inspections, organization of contacts between supervisors, etc. (see e.g. Majaha-Jartby and Olafsson, 2005). MoU may be drafted with respect to a specific cross-border (cross-sector) group or may be more general, describing expected behaviour of authorities in specific situations. In accordance with their competencies, authorities such as central banks or treasuries, in addition to supervisory authorities, may be parties to these MoU. However, MoU do not prevail over national laws and do not modify responsibilities of national authorities (see e.g. Wymeersch, 2005).

The reinforcement of supervisory coordination and convergence of supervisory practices are essential for mitigating potential conflicts of interest between national authorities. These activities also help to create networks of authorities. Creation of such networks is a necessary – although not sufficient – condition for diminishing conflicts of interest in the management of cross-border crises, as trust appears to be an essential element in the management of a crisis. The economic literature on “social capital” confirms this view and suggests indeed that social connections may help agents to interact co-operatively⁽¹⁾. One of the objectives of networks of supervisors is to create this social capital. However, if a significant crisis were to arise, conflicts of interest could potentially take the upper hand over trust. More robust mechanisms are probably needed for identifying conflicts of interest and solving or mitigating them.

(1) Glaeser et al. (2000) use experimental economics to show that trust may facilitate the co-operation necessary to achieve a public good.

3.3 Looking forward: Identification of conflicts of interest and design of a robust crisis resolution mechanism

There would appear to exist some prerequisites for defining a robust mechanism for dealing with cross-border crises. The development of such a mechanism could be structured around three steps: (1) agreement on conditions for potential recourse to public funds; (2) clear definition of crisis responsibilities and (3) test of the proposed framework. In addition, a clear definition of objectives, roles and responsibilities of agencies in charge of crisis management at the national level could facilitate the development of procedures for cross-border crisis management.

Agreement on conditions for potential recourse to public funds: As crisis management may require public funds, it would be desirable to agree ex-ante on the conditions under which public funds would be used and how costs, if any, would be allocated. The design of such a mechanism would therefore need to answer at least two questions:

- (a) In which cases could public funds (taxpayers’ money) be used, and which cases must be solved without public funds?
- (b) How to share costs in the cases where public funds are used?

(a) The recourse to public funds to manage a crisis usually constitutes a last resort. In theory, public funds should be used to indemnify retail depositors only when the deposit insurance scheme is publicly funded. In other cases, authorities should try to limit their role to the provision of emergency liquidity assistance, if necessary, and to the role of a “powerful broker” in facilitating a market-based solution to the crisis. These latter mechanisms also present the advantage of limiting moral hazard. As such mechanisms are by nature ad-hoc, however, the range of measures that could be implemented and the nature of critical functions that should be protected should be further studied.

In practice, however, despite authorities’ ability to make use of these mechanisms, in some extreme situations the use of public funds may nevertheless be required to avoid very large disruptions in the banking sector. Yet, even in these situations, it remains essential to try to restrict the use of public funds to the indemnification of retail depositors. Different ways to do this should be explored. First, ensuring the continuity of critical functions is one avenue that could be pursued. Second, the Purchase and

Assumption (P&A) regime implemented in the US could be further studied, especially as this regime, in which a healthy financial institution *purchases* (some of) the assets of an ailing bank (e.g. loans) and *assumes* (some of) its liabilities (e.g. insured deposits and secured liabilities), enables authorities to protect insured depositors⁽¹⁾ without necessarily extending their protection to uninsured depositors. Third, the restriction on the recourse to public funds suggests that some sort of firewalls could be put in place to prevent a shock arising from a complex financial group's potentially riskier activities from affecting the bank's retail depositors. This principle would facilitate the design of cross-border cost sharing agreements. Some large and complex financial institutions have adopted organisational structures that potentially limit excessive contagion from wholesale activities to retail activities, for instance by locating some of their activities in subsidiaries rather than in a department of the same legal entity⁽²⁾. From a public good perspective, an advantage associated with this structure is that while such an organisational design does not prevent the mother company from supporting a legally isolated business line in a stressful environment, it would help to cap the public support in the extreme cases where public funds would be at risk. In a cross-border setting, an agreement to better define the limits of potential public support is an important condition, although not the only one, for a more integrated financial supervisory architecture.

(b) The presence of different national pools of tax-payers suggests that it would be desirable to define ex-ante a mechanism to allocate costs in *tempore non suspecto*, in order to avoid tensions between national authorities in a crisis. The question of the burden sharing in case of crisis is addressed in Goodhart and Schoenmaker (2006). Three important features of cost sharing schemes would need to be addressed:

1. Should the mechanism be bank-specific or not ?
2. Should the mechanism be prefinanced or not ?
3. Which rule should be used to allocate costs ?

(1) On the P&A regime, see e.g. chapter 3 of FDIC (1998). The range of possible P&A resolution structures implemented by the FDIC varies from the basic P&A to more complex structures requiring a bridge bank or a loss sharing P&A. In a basic P&A transaction, cash and cash equivalents are passed to the acquirer, together with some of the insured deposits. Besides cash, loans may also be passed to the acquirer (such as in loan purchase P&As or in modified P&As). Put options on certain assets that are transferred may be offered by the FDIC to the acquirer in order to induce the acquirer to accept a larger share of the assets. In order to decrease the amount of assets it holds, the FDIC may also organise, in some cases, a bid that concerns all the assets of the ailing bank (whole bank P&As). Instead of selling assets at a discounted price, in loss sharing P&As, the FDIC accepts to assume some of the future losses of the transferred pool of assets. In a bridge bank structure, the acquirer is the FDIC (see box 1 for more information on bridge bank structures). See also Covitz et al. (2004) for the impact of the introduction of the P&A regime on subordinated debt issuance decisions in the US and on its implications for market discipline.

(2) Such structures were implemented for reasons which are not directly linked to financial stability. For instance, the asset management business line is often incorporated in a subsidiary. This may be less the case for investment banking.

These choices are important, as they influence the incentives for authorities to co-operate.

1. In a bank-specific mechanism, only the countries in which the bank requiring assistance is active (according to the allocation rule) would provide finance. If the mechanism is not bank specific, all the countries participating in the cost sharing mechanism are "jointly liable" in case of a crisis. The choice of this feature would not only affect the crisis management setting but would likely have an important bearing on the supervisory architecture.
2. With prefinancing, participants allocate premiums to a fund that could be tapped on short notice by an authority which, ideally, would internalize all the domestic and cross-border knock-on effects resulting from the crisis. The funds could also be supplied only if a crisis arises, according to a predetermined sharing rule.

Both prefinancing and ex-ante cost sharing mechanisms may be problematic. First, as the amount of funds that would be necessary to manage a crisis is uncertain, *prefinancing* may be difficult because the fund could be quickly exhausted in a severe crisis. Should the fund be depleted, participants who were not affected by the crisis might be reluctant to refinance the fund. In addition, setting up such a fund might create moral hazard problems for banks and for authorities in charge of supervision.

Ex-ante cost sharing agreements, on the other hand, are also complex to implement. The crisis "game" is played only once or very infrequently, so there may only be limited possibilities to punish deviations (though repeated interactions in the course of supervision in normal times and throughout the evolution of the crisis might introduce some ways to punish deviations). In addition, contracts are necessarily incomplete, as they can not take account of all possible contingencies. Cost-sharing mechanisms might also reveal themselves to be inconsistent with Community rules preventing state aid to ailing firms. Goodhart (2005) argues that at the national level, authorities in charge of crisis management could decide to solve the emergency situation first and to check consistency with EU directives at a later stage. This would seem to be more problematic to accomplish with funds managed directly at the EU level.

3. The choice of a rule to allocate the costs of a crisis is conceptually and practically difficult but is nevertheless critical, as it will influence the incentives and behaviour of both banks and authorities. An additional question regarding such a rule, however, is whether it should be based on (risk-weighted) assets, liabilities, or on some other criterion.

Definition of crisis management responsibilities:

The preceding analysis suggests that the current framework for crisis management could be improved. Any new framework, however, would need to be compatible with the funding mechanism and should provide a clear allocation of responsibilities. As the design of the funding mechanism is intrinsically linked to the allocation of responsibilities, the compatibility between these two components should be assured. In addition, compatibility of the funding mechanism and the allocation of responsibilities with the supervisory architecture should be also checked, as they are fundamentally interrelated.

The current institutional design leaves too much room for unconstructive ambiguity and for tensions⁽¹⁾. In order to reduce these, it might be necessary to consider automatic procedures for triggering crisis management, such as prompt corrective action rules. Allocation of responsibilities also implies not only clearly defining the legal responsibilities of each authority but also ensuring the will of each authority to perform the assigned tasks in case of crisis and the capacity of these authorities to perform the assigned tasks. In addition, the allocation of responsibilities should have an undisputable legal basis.

Test of the proposed crisis resolution mechanism:

Some authors have argued that a small cross-border crisis (small enough to avoid any serious problem but large enough to highlight potential weaknesses of current

arrangements) could be desirable (see e.g. Goodhart, 2005). Well-designed stress-tests however also allow identification of weaknesses of proposed crisis management arrangements before they come into force. Such exercises have the added benefit of reinforcing networks of crisis management authorities, which may reduce obstacles to communication and coordination in an actual crisis. Finally, stress-tests can allow identification of situations in which conflicts of interest are likely to materialize and indicate which components of national legal frameworks could be conflicting. Yet, the extent to which these stress-tests are really informative depends on the willingness of participants to act as if they were facing a real crisis. For example, participants may have ex-ante incentives to act cooperatively during exercises but less cooperatively in real crises.

This three-step approach is likely to deliver several different frameworks for crisis management. Some of these frameworks may require institutional or legal changes, especially as one may have reached the limits of what is legally possible to undertake in order to improve cross-border crisis management in the current environment. The feasibility of each resulting framework may therefore be assessed as a function of the necessary changes it would imply. In addition, it is essential to understand that a necessary condition for the system to work is that the allocation of responsibilities be compatible with the agreement on the conditions for potential recourse to public funds and vice-versa. Yet, although a cost allocation scheme should be part of that agreement, it would seem essential to explore any avenue that would allow limiting the recourse to public funds, especially as public funds should only be used in a very restrictive number of cases. Pursuing such an avenue could help to reduce the different sources of moral hazard that are currently excessively present within the financial system and thereby reinforce market discipline.

(1) Note that "the need to clarify and optimise home-host responsibilities as integration accelerates" is one of the challenges identified by the Commission of the European Communities (2005).

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The impact of sector concentration in loan portfolios on economic capital

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Introduction

The 1988 Basel Accord stipulated that a bank should hold minimum capital in the amount of eight percent of its risk-weighted assets. One of the key features of the computation of risk-weighted assets as specified by the Accord was that all loans to firms were assigned equal risk weights, independently of the actual riskiness of the loan. A second feature of the computation was that total risk-weighted assets were obtained by simple summation of the individual risk-weighted assets. In other words, no account was taken of concentration; banks with more concentrated loan portfolios did not have higher minimum capital requirements than banks with diversified portfolios.

The Basel II Framework aims to tailor banks' minimum regulatory capital requirements more closely to the riskiness of their loans. Pillar 1 of this Framework proposes new approaches for determining minimum capital requirements. Banks are able to choose between a standardised approach, which bases the risk weight for a firm on the rating assigned to the firm by an external rating agency, or two internal ratings-based (IRB) approaches, which assign a firm's risk weight on the basis of the bank's internally estimated probability of default for the firm (in addition to other variables). However, for reasons of tractability and feasibility, total risk-weighted assets are still to be computed by summing the individual risk-weighted assets. This implies that the additional capital requirements that banks need to hold when adding an exposure is the same whether the portfolio is well diversified or highly concentrated (this feature is called portfolio invariance).

In the internal ratings-based approaches of Pillar 1, the risk-weight functions, which map firms' probabilities of default to a risk weight, also have the property of being portfolio invariant. These risk-weight functions are based on a model that assumes that firms' returns on assets are affected by an idiosyncratic shock and a single systematic risk factor, which is the same for all firms. Correlations between firms' asset returns are determined by their sensitivity to this risk factor and depend on the probability of default and firm size. Hence, the risk-weight formulas used in Pillar 1 do not allow for correlations among firms' asset returns which depend upon the sectors in which the firms operate. The assumption that the performance of banks' loan portfolios is affected by one single systematic risk factor is appropriate only to the extent that the portfolio is perfectly diversified across industrial and regional sectors.

Concentration risk in banks' credit portfolios does not only arise from an excessive exposure to a single sector or to several highly correlated sectors (i.e. "sector concentration"), it can also arise from an excessive exposure to certain names (which is often referred to as "name concentration" or "granularity"). The Basel Committee recognises that the risk-weight functions do not explicitly account for name or sector concentration. Therefore, the Basel II Framework stipulates that credit risk concentration should be addressed in the context of Pillar 2, which involves the supervisory review process. To date, financial regulation and research have focused mainly on name concentration⁽¹⁾. The focus of this article is on sector

(1) See EU Directive 93/6/EEC, Joint Forum (1999), Gordy (2003).

concentration risk, where sectors are defined as business sectors. Although geographical regions can also be modelled as sectors, we do not consider that case here.

Sector concentration risk is an important issue; for instance, if a loan portfolio is excessively concentrated in credit to firms in a particular sector, a shock to the sector can have a significant impact on the entire portfolio. Indeed, the importance of prudently managing sector concentration risk in banks' credit portfolios is generally well recognised. However, existing literature does not provide much guidance on how to measure sector concentration risk, or on the levels of concentration that merit concern. From a regulatory and financial stability perspective, questions arise as whether or how particular levels of sector concentration should be translated into additional capital requirements.

We address these issues by simulating loss distributions of loan portfolios that have sectoral distributions that are similar to actual banks' portfolios, in order to measure the potential impact of concentration risk. In particular, we ask what effect increasing sector concentration will have on a bank's economic capital (EC), which is defined as the amount of capital a bank would need to cover losses up to a specified percentile of the portfolio loss distribution. In order to allow for differing inter-sectoral and intra-sectoral asset correlations, we allow firms' outcomes to depend upon multiple risk factors.

We construct a benchmark portfolio whose sectoral distribution of loans reflects the sectoral distribution of aggregate loans to corporates and SMEs in the German banking sector (and which is also similar to the aggregate sectoral distribution in several other European countries). After determining the economic capital for the benchmark portfolio, we construct a sequence of portfolios with increasing sector concentration and analyse the impact of this concentration on economic capital. We find that increasing sector concentration in loan portfolios does indeed cause a significant increase in a bank's economic capital, and this result holds for sectoral loan distributions similar to those actually observed in some individual banks' portfolios. This suggests the need for research aimed at developing simple quantitative tools that bank supervisors can use for measuring concentration risk in banks' loan portfolios.

The article is organised as follows. In Section 1 we present the CreditMetrics model, which is used to simulate the portfolio loss distributions. The loan portfolios on which the simulations are based are described in Section 2. In Section 3 we analyse the impact of sector concentration on economic capital. We conclude in Section 4.

1. Measuring concentration risk in a multi-factor model

To simulate portfolio loss distributions, we use the well-known CreditMetrics model, which is a highly stylised version of a Merton-type model⁽¹⁾. In this model default happens when a variable X_i , which we denote as firms' asset returns⁽²⁾, falls below a default threshold (DD_i) over the considered time horizon. In what follows we will assume that the variables X_i have a standard normal distribution. The probability of default of firm i (PD_i) is defined by

$$(1) \quad PD_i = \Pr(X_i < DD_i) = \Phi(DD_i),$$

where Φ is the cumulative standard normal distribution function. Conversely, the value of DD_i can be determined from this relation if the PD_i is known.

In order to capture sectoral dependencies among firms and to examine the effects of differing levels of sector concentration in loan portfolios on the bank's economic capital, we use a multi-factor version of the CreditMetrics model. More specifically, we assume that each firm can be uniquely assigned to a single sector⁽³⁾. We also assume that the asset return over the risk horizon of one year can be decomposed into a sector-specific (systematic) and a firm-specific (idiosyncratic) component

$$(2) \quad X_i = r_s Y_s + \sqrt{1 - r_s^2} \varepsilon_i$$

where Y_s is an industry sector risk factor and ε_i an idiosyncratic risk factor which are both assumed to have a standard normal distribution. The coefficient r_s , referred to as the sector factor loading, measures the sensitivity of firm i 's asset return to the sector factor Y_s .

We further assume that the sector risk factor Y_s can be expressed as a linear combination of independent risk factors Z_1, \dots, Z_S , each of which is assumed to have a standard normal distribution, and where the number of factors corresponds to the number of sectors. That is,

$$(3) \quad Y_s = \sum_{j=1}^S \alpha_{s,j} Z_j \quad \text{for } 1 \leq s \leq S,$$

where coefficients $\alpha_{s,j}$ must satisfy the relation

$$\sum_{j=1}^S \alpha_{s,j}^2 = 1 \quad \text{to ensure that } Y_s \text{ has unit variance. As can}$$

(1) See also Gupton et al. (1997), Gordy (2000), and Bluhm et al. (2003) for more detailed information on these types of models. The origin of these models can be found in the seminal work by Merton (1974).

(2) Technically, the variables X are unobservable variables that drive asset returns, however it is standard procedure to use the term asset return.

(3) In practice (large) firms often comprise business lines from different industry sectors. However, we pose this assumption here for practical and presentational purposes.

be seen from this equation, the sector factors are correlated through their mutual dependence on the independent risk factors Z_1, \dots, Z_S via these coefficients $\alpha_{s,j}$. Sector factor correlations are defined as correlations between the

sector factors Y_s and Y_t and are given by $\sum_{n=1}^S \alpha_{s,n} \alpha_{t,n}$.

In our simulations, the coefficients $\alpha_{s,j}$ are estimated from the correlation matrix of industry equity indexes using a Cholesky decomposition⁽¹⁾.

The asset correlation for each pair of borrowers i and j in sectors s and t can be shown to be given by:

$$(4) \quad \text{cor}(X_i, X_j) = r_s r_t \sum_{n=1}^S \alpha_{s,n} \alpha_{t,n}.$$

Given that $\sum_{j=1}^S \alpha_{s,j}^2 = 1$, equation (4) implies that the

intra-sectoral asset correlation for each pair of borrowers is simply r_s^2 . For the simulations in this paper, we assume

that $r_s = 0.5$ for each sector. This implies that the intra-sectoral asset correlations are equal to 0.25.

We use the above model of firm asset returns and the default condition to simulate a portfolio loss distribution. To compute the losses for firms in default, we assume a loss given default (LGD) of 45 p.c. for each firm, which is also the supervisory value set for senior unsecured corporate loans in the Foundation IRB approach of the Basel II Framework. Our measure of risk is economic capital, which covers only the unexpected loss and which is defined as the difference between the 99.9 p.c. percentile of the loss distribution and the expected loss. The Monte Carlo approach used for the simulation of the portfolio loss distribution is described in Box 1.

(1) If C is an $N \times N$ correlation matrix, the Cholesky matrix is the $N \times N$ symmetric positive definite lower triangular matrix A , such that $C = AA^T$. A lower triangular matrix has zeros on the upper right corners above the diagonal. The superscript " T " denotes the "transpose" of the matrix.

Box 1 – Monte Carlo approach to simulating the portfolio loss distribution

Assume there are N firm borrowers in the portfolio, each borrower can be assigned to a sector s , and C_i denotes the loan amount of borrower i .

Determine the default probability PD_i for each of the N firms in the portfolio. (For the simulations of this paper, we assume that each firm's PD_i is initially equal to 2 p.c.⁽¹⁾).

Compute the default threshold DD for each of the N firms, using relation (1): $\Phi^{-1}(PD_i) = DD_i$, where Φ^{-1} is the inverse of the cumulative standard normal function.

Generate a vector of the uncorrelated, standard normally distributed factors Z_j (which appear on the right-hand side of equation (3)).

Use the Cholesky matrix $(\alpha_{s,t})_{1 \leq s, t \leq S}$ obtained from the sector factor correlation matrix (As mentioned in the text, the correlation matrix of sectoral equity indices is used as a proxy for the sector factor correlation matrix,

whose elements are $\sum_{n=1}^S \alpha_{s,n} \alpha_{t,n}$).

Multiply the Cholesky matrix with the independent risk factors Z_j to obtain the correlated sector risk factors Y_s (see equation (3)).

For each firm i construct the value X_i , using the sector risk factor Y_s , the sector sensitivities r_s , and an idiosyncratic shock ε_i generated from a standard normal distribution (see equation (2)). (Our simulations assume that the sector sensitivities are equal to 0.5 for each sector.)

(1) This assumption is relaxed in a robustness check.



For each firm i , determine whether it is in default by comparing X_i with DD_i . If $X_i < DD_i$, firm i is in default. The loss for each firm in default is by multiplying LGD, with the exposures size C_i . (In our simulations LGD is set at 45 p.c. for each firm.)

Compute the losses L for the entire portfolio by summing the losses for each firm in default. Label this value L_m where m represents the number of this simulation run.

Repeat the above steps until the desired number M of simulation runs has been completed.

Arrange the loss values L_m , for $m = 1$ to M , in ascending order. This gives the empirical portfolio loss distribution, from which values such as expected loss, value at risk, and economic capital can be computed.

2. Portfolio composition

2.1 Data set and sectoral definitions

Our analyses are based on portfolios that reflect characteristics of real portfolios, obtained from German credit register data. Our benchmark portfolio represents the overall sector concentration of the German banking system as it was constructed by aggregating the exposure values of loan portfolios of 2224 German banks in September 2004. The portfolio includes exposures to firms borrowing from branches of foreign banks located in Germany. Credit exposures to foreign borrowers, however, are excluded. We deem this to be a reasonable approximation of a well-diversified portfolio based on the intuition that a portfolio cannot be more diversified than in the case in which it represents the average relative sector exposures of the national banking system. In principle, we could also have created a more diversified portfolio in the sense of having a lower VaR. However, such a portfolio would be specific to the credit risk model used and would not be obtainable for all banks.

All credit institutions in Germany are required by the German Banking Act (*Kreditwesengesetz*) to report quarterly exposure amounts of those borrowers whose indebtedness to them amounts to at least 1.5 millions of euro or more at any time during the three calendar months preceding the reporting date. Individual borrowers are summarised to *borrower units* which are linked, for example, by investments and constitute an entity sharing roughly the same risk. The aggregation of exposures on a business sector level was carried out on the basis of borrower units. Therefore, the credit register includes not only exposures above 1.5 millions of euro but also smaller exposures to individual borrowers belonging to a borrower unit

that exceeds this exposure limit. This characteristic also increases its coverage which is around 90 p.c. of the German credit market, including inter-bank exposures.

The industry classification chosen by CreditMetrics is the Global Industry Classification Standard (GICS), which was launched jointly by Standard & Poor's and Morgan Stanley Capital International (MSCI) in 1999. The classification scheme was developed to establish a global standard for categorising firms into broad sectors and into more detailed industry groups according to their principal business activities (see Table 8 in the Appendix). In the following we use the broad sector classification scheme⁽¹⁾. Because some of the industry groups that form the broad sector "Industrial" are very heterogeneous, we decided to split this sector into the three industry groups: Capital goods (including construction), Commercial services and supplies, and Transportation.

Credit register data sets, however, use the NACE industry classification system, which is quite different from the GICS system. In order to use the information from the credit register, we have performed a mapping⁽²⁾ from the NACE codes to the GICS codes. We have excluded exposures to financials because of the specificities of this sector. Exposures to the real estate sector are heavily biased as it comprises a large number of exposures to borrowers that are related to the public sector. Finally, we also have disregarded exposures to households since a representative equity index does not exist for them. In sum, we distinguish between 11 sectors, which can be considered as broadly representing the asset class corporate and SMEs.

(1) Unreported simulations have shown that results are not affected when using the more detailed classification scheme.

(2) This mapping function is presented in the appendix in Düllmann and Masschelein (2006).

2.2 Comparison with French, Belgian and Spanish banking systems

A rough comparison of the sectoral composition of aggregate exposures in the German, French, Belgian and Spanish banking systems is shown in Table 1. This table reveals that the distributions are relatively similar. The only noticeable differences are the greater importance of the Capital goods sector (33 p.c.) in Spain compared to Germany and Belgium, and the lesser importance of the Commercial services and supplies sector in Spain compared to Germany and Belgium. In general, however, the average sector concentrations are very similar across the four countries, which suggests that our results are to a large extent transferable to these countries.

2.3 Description of benchmark portfolio

The sectoral distribution of exposures in the benchmark portfolio is shown in Table 2 assuming that the total portfolio has a volume of 6 millions of euro. As mentioned above, this portfolio represents the sectoral distribution of aggregate exposures in the German banking system. It is possible for banks to use a more detailed sector classification scheme. We consider it more conservative to use a broad sector classification scheme rather than a very detailed scheme. In a broad sector classification scheme, a larger proportion of exposures is attached to a

sector. Therefore, correlations between exposures of the same sector, which are typically greater than the correlations between exposures of a different sector, will play a larger role.

In order to focus on the impact of sector concentration we assume an otherwise homogeneous portfolio by requiring that all other characteristics of the portfolio are uniform across sectors. We further assume that the total portfolio volume of 6 millions of euro consists of 6,000 exposures of equal size which have a uniform probability of default of 2 p.c. We set a uniform LGD of 45 p.c., which is the supervisory value for a senior unsecured corporate loan in the Foundation IRB approach of the Basel II Framework⁽¹⁾.

2.4 Sequence of portfolios with increasing sector concentration

In order to measure the impact on *EC* of more concentrated portfolios than the benchmark portfolio, we construct a sequence of six portfolios, each with increased sector concentration relative to the previous portfolio in the sequence.

(1) See BCBS (2005).

TABLE 1 COMPARISON OF BANKS' AVERAGE SECTOR CONCENTRATIONS IN GERMANY, FRANCE, BELGIUM AND SPAIN
(Percentages)

Sector	Germany	France	Belgium	Spain
A. Energy	0.18	0.88	0.05	1.05
B. Materials	6.01	3.97	7.45	9.34
C. <i>Industrials</i> ⁽¹⁾	52.36	63.82	54.77	48.53
1. Capital goods	11.53	n.	9.89	32.90
2. Commercial services and supplies	33.69	n.	37.74	10.20
3. Transportation	7.14	n.	7.14	5.43
D. Consumer discretionary	14.97	11.91	15.77	18.60
E. Consumer staples	6.48	7.21	7.05	10.20
F. Health care	9.09	5.00	5.64	1.85
H. Information technology	3.20	1.47	1.86	1.99
I. Telecommunication services	1.04	1.91	0.54	2.67
J. Utilities	6.67	3.82	6.87	5.77

(1) Aggregate of C1, C2 and C3 only used for comparison with French data, not used in the analysis.

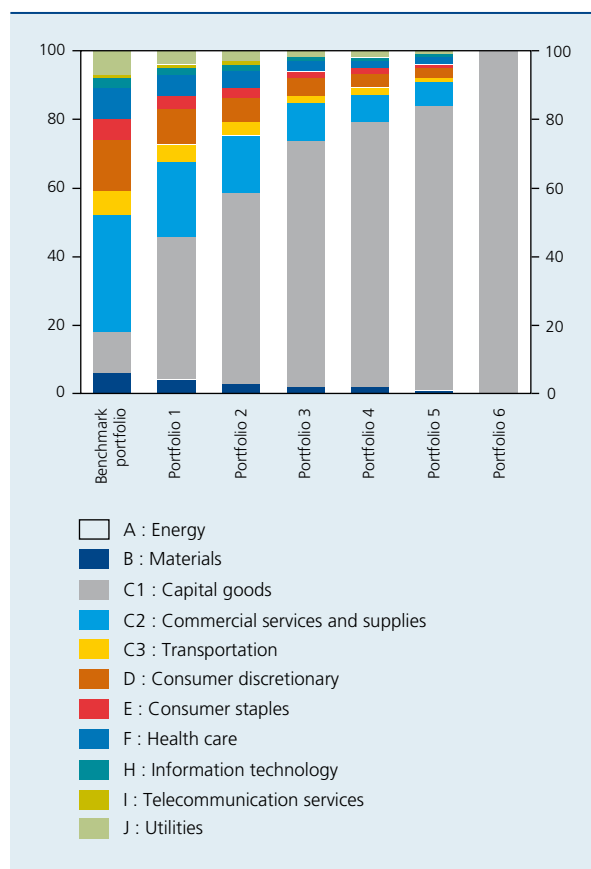
TABLE 2 COMPOSITION OF THE BENCHMARK PORTFOLIO
(Using the GICS sector classification scheme)

Sector	Total exposure (thousands)	Number of exposures	Exposure (percentages)
A. Energy	11	11	0.18
B. Materials	361	361	6.01
C. <i>Industrials</i>			
1. Capital goods	692	692	11.53
2. Commercial services and supplies	2,020	2,020	33.69
3. Transportation	429	429	7.14
D. Consumer discretionary	898	898	14.97
E. Consumer staples	389	389	6.48
F. Health care	545	545	9.09
H. Information technology	192	192	3.20
I. Telecommunication services	63	63	1.04
J. Utilities	400	400	6.67
Total	6,000	6,000	100.00

TABLE 3 SEQUENCE OF PORTFOLIOS WITH INCREASING SECTOR CONCENTRATION ⁽¹⁾
(Percentages)

	Benchmark portfolio	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6
A. Energy	0	0	0	0	0	0	0
B. Materials	6	4	3	2	2	1	0
C. <i>Industrials</i>							
1. Capital goods	12	41	56	71	78	82	100
2. Commercial services and supplies ..	34	22	17	11	8	7	0
3. Transportation	7	5	4	2	2	1	0
D. Consumer discretionary	15	10	7	5	4	3	0
E. Consumer staples	6	4	3	2	2	1	0
F. Health care	9	6	5	3	2	2	0
H. Information technology	3	2	2	1	1	1	0
I. Telecommunication services	1	1	1	0	0	0	0
J. Utilities	7	4	3	2	2	1	0
HHI	17.6	24.1	35.2	51.5	61.7	68.4	100.0

(1) Portfolio 2 and portfolio 5 reflect real bank portfolios.

CHART 1 SEQUENCE OF PORTFOLIOS WITH INCREASING
SECTOR CONCENTRATION⁽¹⁾

(1) Portfolio 2 and portfolio 5 reflect real bank portfolios.

Table 3 and Chart 1 illustrate the sequence of portfolios. The increase in sector concentration is also reflected in the Herfindahl-Hirschman-Index (HHI)⁽¹⁾, which is calculated at sector level. Portfolio 1 has been constructed from the benchmark portfolio by re-allocating one third of each sector exposure to the sector Capital goods. The more concentrated portfolios 2, 3, 4 and 5 have been created by a repeated application of this rule. The sector Capital goods and the algorithm have been chosen in such a way that portfolios 2 and 5 are similar to real portfolios of existing banks⁽²⁾. They are similar insofar as the sector with the largest exposure size has a similar share of the total portfolio. Furthermore, the HHI is similar to what is observed in real-world portfolios. Finally, we created portfolio 6 with the highest degree of concentration as a one-sector portfolio by shifting all exposures to the Capital goods sector.

2.5 Intra- and inter- sectoral correlations

The sector factor correlations are estimated from historical equity index correlations. Table 4 shows the equity correlation matrix of the relevant MSCI EMU industry indices⁽³⁾. The sector factor correlations are based on weekly return data covering the period from November 2003 to November 2004. Sectors that are highly correlated with other sectors (i.e. sectors that have an average inter-sector equity correlation greater than 65 p.c.) are: Materials (B), Capital goods (C1), Transportation (C3) and Consumer discretionary (D). Sectors that are moderately correlated with other sectors, i.e. sectors that have an average inter-sector equity correlation of between 45 p.c. and 65 p.c., are Commercial services and supplies (C2), Consumer staples (E), and Telecommunication (I). Sectors that are the least correlated with other sectors, i.e. sectors that have an average inter-sector equity correlation of less than 45 p.c., are: Energy (A) and Health care (F). The relative order of these sectors is broadly in line with results reported in other empirical papers⁽⁴⁾. The heterogeneity between the sectors Capital goods, Commercial services and supplies and Transportation is confirmed by noticeable differences in correlations. The intra-sector correlations and/or inter-sector correlations between exposures are obtained by multiplying these sector factor correlations of Table 4 with the factor weights of the exposures.

The value of the sector factor weights r_s in (1) is calibrated to the corresponding IRB regulatory capital charge. More precisely, we use a sector factor loading $r_s = 0.50$ for all sectors, which ensures that the *EC* equals the IRB capital charge for corporate exposures, assuming a default probability of 2 p.c., an LGD of 45 p.c., and a maturity of one year. This value is slightly more conservative than empirical results for German companies suggest⁽⁵⁾.

Intra-sector asset correlations between exposures are thus fixed at 25 p.c. Inter-sector asset correlation can be calculated by multiplying the factor weights of both sectors by the inter-sector equity correlation. The lowest equity correlation between the Energy equity index and the Information technology index of 10 p.c. translates into an inter-sector asset correlation between exposures

(1) The HHI is calculated by summing the squares of the shares of each sector in the portfolio.

(2) Due to confidentiality requirements, we cannot reveal more detailed information.

(3) The correlation matrix based on MSCI US data is similar.

(4) See, for example, De Servigny and Renault (2001), FitchRatings (2004) and Fu et al. (2004). It is very hard to compare the absolute inter-sector correlation values as different papers report different types of correlations. De Servigny and Renault (2001) report inter-sector default correlation values, FitchRatings (2004) reports inter-sector equity correlations while Fu et al. (2004) provides correlation estimates inferred from co-movements in ratings and asset correlation estimates. Furthermore, the different papers distinguish between a different number of sectors.

(5) See Hahnenstein (2004).

TABLE 4 CORRELATION MATRIX OF MSCI EMU INDUSTRY INDICES

(Based on weekly log return data covering the November 2003 until November 2004 period; in percentages)

	A	B	C			D	E	F	H	I	J
			1	2	3						
A. Energy	100	50	42	34	45	46	57	34	10	31	69
B. Materials		100	87	61	75	84	62	30	56	73	66
C. <i>Industrials</i>											
1. Capital goods			100	67	83	92	65	32	69	82	66
2. Commercial services and supplies ..				100	58	68	40	8	50	60	37
3. Transportation					100	83	68	27	58	77	67
D. Consumer discretionary						100	76	21	69	81	66
E. Consumer staples							100	33	46	56	66
F. Health care								100	15	24	46
H. Information technology									100	75	42
I. Telecommunication services										100	62
J. Utilities											100

of 2.5 p.c. The highest equity index correlation occurs between the Commercial services and supplies and the Consumer discretionary sector index. At 92 p.c., it translates into an inter-sector asset correlation between exposures of 23 p.c.

As mentioned before, the model underlying the Basel II Framework assumes that all systematic risk is driven by a single risk factor model and therefore takes no account of the fact that asset correlations can vary across sectors. Asset correlations are defined as a decreasing function of the probability of default. More specifically, these correlations vary between 12 p.c. for low quality exposures and 24 p.c. for high quality exposures. In our analysis we allow for a variation between 2.5 p.c. (which is the lowest inter-sector asset correlation) and 25 p.c. (which is the highest intra-sector asset correlation).

3. Impact of sector concentration on economic capital

3.1 Main results

The results for the *EC* of the seven portfolios are given in Table 5. We observe that, for our corporate benchmark portfolio, *EC* is estimated at 7.8 p.c. Economic capital increases when we gradually increase sector concentration. From the benchmark portfolio to portfolio 2, *EC* increases by more than 20 p.c. *EC* for the relatively

concentrated portfolio 5 increases by a substantial 37 p.c. relative to the benchmark portfolio. These results demonstrate the importance of taking sector concentration into account when calculating *EC*.

Typically, the corporate portfolio comprises only a fraction of the total loan portfolio (which also contains loans to sovereigns, other banks and private retail clients). Although the increase in sector concentration may have a significant impact on the *EC* for the corporate credit portfolio, it may have a much smaller impact in terms of a bank's total credit portfolio. For a meaningful comparison, we assume that the corporate credit portfolio comprises 30 p.c. of the total portfolio and that the banks need to hold capital amounting to 8 p.c. of the outstanding exposure for their total portfolio which also comprises, for example, retail exposures. By assuming that there are no diversification benefits between corporate exposures and the bank's other assets, the *EC* of the total portfolio can be determined as the sum of the *EC* for the corporate exposure and the *EC* for the remaining exposures.

Table 5 compares *EC* for a corporate portfolio with *EC* for the total portfolios. For the total portfolios 1 to 6, *EC* increases only because the sector concentration in the corporate portfolio increases, whereas *EC* for other assets remains constant at 8 p.c. As expected, the impact of an increase in sector concentration is much less severe when looking at the *EC* for the total portfolio. Total *EC* increases in portfolio 2 by 6 p.c. relative to the benchmark portfolio and in portfolio 5 by 11 p.c.

TABLE 5 IMPACT OF SECTOR CONCENTRATION ON ECONOMIC CAPITAL FOR THE SEQUENCE OF CORPORATE PORTFOLIOS
AND FOR THE SEQUENCE OF TOTAL PORTFOLIOS OF A BANK
(Percentages)

	Benchmark portfolio	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6
Corporate portfolio	7.8	8.8	9.5	10.1	10.3	10.7	11.7
Total portfolio	8.0	8.3	8.5	8.7	8.8	8.9	9.2

These results are in line with the empirical paper on US data by Burton et al. (2005), who simulated the distribution of portfolio credit losses for a number of real US syndicated loan portfolios. They find that, although name concentration can meaningfully increase *EC* for smaller portfolios (with exposures of less than 10 billions of dollar), sector concentration risk is the main contributor to *EC* for portfolios of all sizes.

3.2 Robustness checks

The procedure for generating a sequence of portfolios with increasing sector concentration is by no means unique. Therefore, we employ two alternative rules to generate these portfolios. The idea is that each new sequence of portfolios is generated by assigning exposures to the sector, which exhibits the highest (the "High-*MEC* rule") or by assigning exposures to the sector with the lowest marginal economic capital⁽¹⁾ (the "Low-*MEC* rule"). The sector with the highest *MEC* appears to be Commercial services and supplies. This is an intuitive result, because this is not only a large sector, it is also moderately correlated with other sectors. The sector with the lowest *MEC* is the Energy sector which is a small sector and one of the least correlated with other sectors.

We find that economic capital increases in a similar way under these alternative rules of portfolio generation. Results are presented in detail in Düllmann and Masschelein (2006). As expected, the economic capital increases at the fastest pace for the sequence of portfolios which are generated by the "High-*MEC*"-rule. Economic capital for the sequence of portfolios generated by the "Low-*MEC*"-rule increases at the slowest pace. The difference between *EC* under the three construction rules, however, diminishes as sector concentration increases.

In order to verify how robust our results are in relation to the input parameters, we have carried out the following four robustness checks (labelled RC1 – RC4 in Table 7):

- a lower uniform PD of 0.5 p.c. instead of 2 p.c. for all sectors (RC1),
- heterogeneous sector-level PDs which were estimated from historical default rates of the individual sectors (RC2) and given in Table 6,
- a sector factor correlation matrix representing the correlation matrix with the highest average annual correlation over the period 1997-2005 (RC3),
- a uniform intra-sector asset correlation of 15 p.c. and a uniform inter-sector asset correlation of 6 p.c. (RC4), which are values also used by Moody's for the risk analysis of synthetic collateralised debt obligations (CDOs)⁽²⁾.

Although the absolute level of *EC* varied between these robustness checks, the relative increase in *EC* compared with the benchmark portfolio is similar to previous results in this section. The results are summarised in Table 7. For Moody's correlation assumptions in RC4, the increase in

TABLE 6 AVERAGE DEFAULT RATES 1990-2004
(Percentages)

A. Energy	1.50
B. Materials	2.80
C. <i>Industrials</i>	
1. Capital goods	2.90
2. Commercial services and supplies ...	3.70
3. Transportation	2.90
D. Consumer discretionary	3.20
E. Consumer staples	3.50
F. Health care	1.60
H. Information technology	2.40
I. Telecommunication services	3.60
J. Utilities	0.60

Source: Own calculation, based on S&P (2004).

(1) The marginal economic capital of a sector is defined as the difference between the *EC* of the whole portfolio including the sector and the *EC* of the portfolio excluding the sector.

(2) See Fu et al. (2004).

TABLE 7 ECONOMIC CAPITAL AS PERCENTAGE OF TOTAL EXPOSURE FOR THE BENCHMARK PORTFOLIO AND ITS PERCENTAGE INCREASE FOR THE MORE CONCENTRATED PORTFOLIOS

	Using "Real-rule"	RC1: PD = 0.5 p.c.	RC2: Heterogeneous PD	RC3: Higher correlation	RC4: Moody's
	(EC, percentages)				
Benchmark portfolio	7.8	3.3	10.0	8.7	4.0
	(Change of EC, percentages)				
Portfolio 1	13	12	11	6	6
Portfolio 2	20	21	15	13	18
Portfolio 3	30	29	25	22	39
Portfolio 4	35	37	27	24	46
Portfolio 5	36	42	32	24	51
Portfolio 6	49	52	42	33	77

EC is stronger than for the other robustness checks. This can be explained by the bigger difference between intra-sector and inter-sector asset correlations, which leads to a stronger *EC* increase when the portfolio becomes more and more concentrated in a single sector. We conclude that the observed substantial relative increase in *EC* due to introducing sector concentration is robust against realistic variation of the input parameters. Furthermore, this increase in *EC* may even be stronger, depending on the underlying dependence structure.

4. Summary and policy implications

The minimum capital requirements for credit risk in the IRB approach of Basel II implicitly assume that banks' portfolios are well diversified across business sectors. Potential concentration risk in certain business sectors is covered by Pillar 2 of the Basel II Framework which comprises the supervisory review process⁽¹⁾. To what extent the regulatory minimum capital requirements may understate the required capital is an empirical question. In this paper we approached this question by using data from the German central credit register. The loss distribution is simulated in the default-mode version of the CreditMetrics multi-factor model, and credit risk is measured by economic capital.

In order to measure the impact of concentration risk on *EC* we start with a benchmark portfolio that reflects average sector exposures of the German banking system. Since the exposure distributions across business sectors were similar in Belgium, France, and Spain, we expect that our main results also hold for other European countries.

Starting with the benchmark portfolio, we have successively increased sector concentration in six steps, considering degrees of sector concentration which are observable in real banks. The last and most concentrated portfolio contained only exposures to a single sector. Compared with the corporate benchmark portfolio, *EC* for the concentrated real portfolios can increase by 37 p.c. and is even higher in the case of a single-sector portfolio. Under the assumption that the corporate credit portfolio comprises 30 p.c. of the total portfolio, *EC* for the total portfolio resembling a real portfolio increases by 11 p.c. relative to the benchmark portfolio. These results clearly underline the necessity to take inter-sector dependency into account for the measurement of credit risk.

We have subjected our results to various robustness checks, first with a lower uniform PD and sector-dependent PDs, based on historical default rates provided by S&P. We have also calculated *EC* for our portfolios using a correlation matrix with the highest observed average factor correlations since 1997. Finally, similarly to the assumptions adopted by Moody's for valuing synthetic CDOs, we have applied a uniform intra-sector asset correlation of 15 p.c. and an inter-sector asset correlation of 6 p.c. In all cases our results remain qualitatively the same. The increase in *EC* may even be stronger than in our original analysis, depending on the underlying dependence structure.

(1) See BCBS (2005), paragraphs 770-777.

In addition to the individual bank level, sector concentration can also play a role from a system-wide risk perspective, if banks' loan portfolios reflect the sectoral concentration within a country and if the degree of this sectoral concentration is high. Furthermore, indicative comparisons, based on the credit registers of four European countries, show similarities in the sectoral distributions of aggregate loan exposures across countries. These similarities imply that diversification across countries generally need not improve the sectoral diversification of a bank.

In our analysis we have used Monte Carlo simulations to measure *EC* in a multi-factor setting, which is computationally burdensome. Approaches that avoid the use of Monte Carlo simulations would in this respect be very helpful. Research on analytic approximations, however, is still in progress⁽¹⁾.

We conclude that sector concentration in individual banks' corporate credit portfolios merits careful attention in banks' internal risk management, since sectoral concentration appears to have a strong impact on credit risk.

(1) See for example Pykhtin (2004), Cespedes et al. (2005), Düllmann (2006) and Düllmann and Masschelein (2006).

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Appendix

TABLE 8 GICS CLASSIFICATION SCHEME:
BROAD SECTORS AND INDUSTRY GROUPS

- A. Energy
 - B. Materials
 - C. *Industrials*
 - 1. Capital goods
 - 2. Commercial services and supplies
 - 3. Transportation
 - D. *Consumer discretionary*
 - 1. Automobiles and components
 - 2. Consumer durables and apparel
 - 3. Hotels, restaurants and leisure
 - 4. Media
 - 5. Retailing
 - E. *Consumer staples*
 - 1. Food and drug retailing
 - 2. Food, beverage and tobacco
 - 3. Household and personal products
 - F. *Health care*
 - 1. Health care equipment and services
 - 2. Pharmaceuticals and biotechnology
 - G. *Financials*
 - 1. Banks
 - 2. Diversified financials
 - 3. Insurance
 - 4. Real estate
 - H. *Information technology*
 - 1. Software and services
 - 2. Technology hardware & equipment
 - 3. Semiconductors & semiconductor equipment
 - I. Telecommunication services
 - J. Utilities
-

The new solvency framework for European insurance companies

Pim Lescauwae
Maciej Sterzynski⁽¹⁾

Introduction

As is the case for banks, there are two main rationales for the existence of specific supervisory arrangements for insurance companies. The first rationale is linked to the protection of small investors. The reasoning is that deposit holders in the case of banks and policyholders in the case of insurance companies are mostly widely dispersed non-experts, as a result of which they lack the expertise to assess the financial soundness of the institution and to fulfil the disciplining role that creditors normally assume in times of financial distress. Moreover, bank depositors and, to a lesser extent, insurance policyholders, are often covered by guarantee schemes, which reduce any incentive they might have to monitor financial institutions' managers' risk taking behaviour. There is a need, therefore, for a "debt-holder representative" who will ensure "effective debt governance" of the institution. This delegated monitoring role is often taken on by public authorities.

The second rationale for the supervision of financial intermediaries derives from the negative externalities associated with a crisis. Banks play a dominant role in payment systems; therefore, bank failures can jeopardise the performance of this critical function. In addition, deposits may be withdrawn on demand and, as such, a bank may be prone to a loss of confidence and runs, which may cause insolvency and create domino effects on other banks, e.g. through the interbank market. Similar, albeit less important, contagion effects could take place in the insurance sector through the reinsurance mechanism, endangering the performance of key economic functions by the insurance sector. Indirectly, insurance companies could also pose threats to financial stability via their links

with the banking sector. These links are most explicit in conglomerates involving bancassurance, but insurance companies are also major participants in financial markets; hence problems in this sector might spill over to other participants in those markets, including banks.

Supervisory authorities rely on specific tools and methods to perform their tasks. Solvency requirements represent one of their most important instruments. In both banking and insurance, the current solvency system takes insufficient account of the risk profile of the individual institutions in setting the capital requirements. To resolve this problem, more risk-sensitive supervisory frameworks are currently being developed. The Basel II framework for banks will be introduced in 2007, and the Solvency II framework for insurance companies is expected to be finalised by the end of the decade.

These new regulatory frameworks not only aim to refine the calculation of capital requirements, but are also intended to encourage the institutions concerned to improve the quality of their risk management procedures. To that end, they introduce a structure comprising three mutually reinforcing pillars. The first pillar corresponds to the imposition of capital and other quantitative requirements geared more closely to the institution's actual risks; a second pillar introduces qualitative requirements and foresees the possibility for prudential authorities to take further account of the specific risk profile of each institution; and a third pillar is intended to encourage market discipline by imposing greater transparency in the public disclosure of information.

⁽¹⁾ Maciej Sterzynski contributed to this article during an internship at the National Bank of Belgium.

Although Basel II and Solvency II have roughly the same philosophy, each needs to take into account the sectoral particularities. In banking, short-term liabilities, such as deposits, are traditionally converted into long-term, illiquid assets. As a result, an important risk for banks is the sudden withdrawal of a large part of their deposit base, potentially triggering liquidity problems. This calls for a supervisory regime that is able to detect such risks beforehand and resolve them quickly. The opposite holds in insurance, where companies have very long-term liabilities, especially in life insurance, and invest in rather liquid assets. This allows supervisors to take a more gradual approach to resolving financial distress.

In addition, the relative importance of the different risks varies between the two types of business. Credit activity, on the assets side, is generally considered to be the primary source of risk in banking. In insurance, the focus is traditionally on underwriting risk, i.e. the risk of underpricing insurance contracts or of underestimating the level of the liabilities towards policyholders. These liabilities, which correspond to insurance companies' technical provisions, are inherently uncertain and have to be estimated. As a result, provisions are much more important than in the case of banks, where both the assets and the liabilities can arguably be more accurately valued.

These specificities of insurance activities are taken into account by insurance regulators and supervisors in the design of the new solvency framework, which is presented in this article. Section 1 briefly describes the current regime and its main weaknesses. Section 2 provides an overview of the main characteristics of the new framework and its development process. Section 3 focuses on the first pillar and analyses the changes and improvements that will be introduced by Solvency II. The last section concludes.

While reading this article, one should bear in mind that the Solvency II framework is still under development. In the coming months, further technical issues will be submitted for advice to the Committee of European Insurance and Occupational Pension Supervisors (CEIOPS, the counterpart of the Committee of European Banking Supervisors in the banking field), and for consultation to the sector.

A number of elements will most likely be subject to change, while others have not yet been touched upon. The final picture will gradually emerge as the negotiations continue and the results of the quantitative impact studies provide additional information.

1. Current solvency regulation for insurance companies

The present solvency framework for EU insurers is determined by the solvency margin system. This regime arises from the First Generation of Insurance Directives (1970s) and was confirmed by the Third Generation of directives in 1992⁽¹⁾. At the beginning of 2000, the European Commission initiated another review of insurance companies' solvency requirements. This resulted in 2002 in the Solvency I framework⁽²⁾, which had to be transposed into national law by 20 September 2003, but for which some member states have transition periods of up to seven years. Solvency I improves the quality of the policyholders' protection. It introduces an adjusted supervisory tool – the modified early warning mechanism⁽³⁾ – and makes solvency requirements for European insurers more robust, pending the introduction of Solvency II.

In the current framework, the capital requirements comprise both the Minimum Guarantee Fund and the required solvency margin. These serve as a buffer, on top of the technical provisions, to protect policyholders and other beneficiaries against potential unexpected claims (e.g. in case of an unforeseen concentration of claims) and other unexpected losses (e.g. investment losses).

The minimum guarantee fund fulfils two important functions. Firstly, it imposes a minimum level of regulatory capital for launching insurance activities. This minimum equals three millions of euros for both life and non-life insurance, although in the latter case this amount may be reduced to two millions of euros, depending on the risks covered. Secondly, it expresses a level of capital below which an insurance company presents an unacceptable risk to policyholders. Therefore, the minimum guarantee fund may not be less than one third of the required solvency margin (see below). Once the capital of an undertaking drops below this level, the supervisor will be obliged to resort to the most severe measures, including withdrawing the company's licence.

The required solvency margin itself is calculated as a fixed percentage of certain balance sheet and income statement items. In the case of non-life insurance, the required solvency margin is equal to the higher of two amounts, calculated on the basis of either the claims or

(1) The single insurance market, which is part of the European internal market, relies on three generations of insurance directives. In general they cover the rules applying to the conduct of insurance activities, including the financial structure of insurance undertakings. See also Sterzynski (2003).

(2) Originally, Solvency I had been meant to consist of two directives, regulating the non-life and life business respectively. Since the three generations of life directives have been unified in a Life Recast Directive (directive 2002/83/EC), the Solvency I life directive was integrated in this new text. Therefore, there currently exists only a Solvency I non-life directive (directive 2002/13/EC).

(3) The early warning mechanism is a supervisory tool allowing an authority to act before the solvency margin is breached. It means the supervisor might require an insurance undertaking to provide a recovery plan for its solvency position once the first symptoms of a deterioration of the overall capital position of a company appear.

the underwritten volume (the premiums). In the former case, the required solvency margin amounts to 26 p.c. of the claims up to 35 millions of euros and 23 p.c. above this level⁽¹⁾. The required solvency margin calculated on the basis of the underwritten volume amounts to 18 p.c. of gross collected premiums below 50 millions of euros, and to 16 p.c. of the premiums above this threshold. In the case of life insurance, the required solvency margin is generally calculated as 4 p.c. of the mathematical provisions.

However, the current framework presents a number of weaknesses. First, the current capital requirement is calculated on the basis of the volume of liabilities, which does not fully reflect the risks inherent in the contracts. Such a method of calculation may even create perverse incentives, as – in life insurance – a company can lower its capital requirements by reducing its technical provisions, while sounder companies, having ample provisions, have to hold a higher amount of capital.

Second, other quantifiable risks, such as interest rate risk and other market risks, are not incorporated in the calculation of the capital requirement.

Third, the availability of sufficient capital is but one of the factors contributing to insurance companies' solvency position. Another important element is the adequacy of the technical provisions, which represent their liabilities towards the policyholders. These have to be estimated, as both the amount and the timing of the future claims are uncertain. The current solvency framework does not include adequately harmonised rules regarding the calculation of the technical provisions.

The technical provisions, in turn, have to be covered by sufficient investments, which constitute the bulk of insurance companies' assets. The adequacy and prudent management of these investments constitutes another cornerstone of the soundness of insurance companies. Again, the current framework only includes very general rules on investment policy and does not provide comprehensive principles requiring insurance companies to manage their investments prudently.

Fourth, the current solvency framework does not include a qualitative assessment, for instance of corporate governance, internal control and risk management practices, which allows to further align capital requirements with the specific profile of each company. It neither comprises market disclosure measures to promote market discipline.

2. The new solvency framework for insurance companies in Europe

2.1 A short description of Solvency II

In order to resolve as far as possible the above-mentioned weaknesses, Solvency II aims at introducing risk-sensitive supervision for insurance companies, relying on a risk-based framework for their solvency assessment. The new framework does not only allow better alignment of the capital requirements with the risk profile of the company, but will also induce insurance undertakings to improve their internal risk management systems. This should lead to better protection for policyholders and greater financial stability, and improve the level playing field within and across sectors. It will also give insurance companies more flexibility in setting their risk profile, permitting a more efficient allocation of capital.

The major goal of Solvency II is thus similar to the one pursued by the new Basel II framework for banks, i.e. to put in place a risk-based capital framework, adapted to the current financial environment. The analogy between the two frameworks should not only limit the potential for regulatory arbitrage, but should also reduce the complexity for conglomerates which have to comply with both regulations. In this vein, both Basel II and Solvency II adopt a three pillar structure and allow the use of internal models (Chart 1).

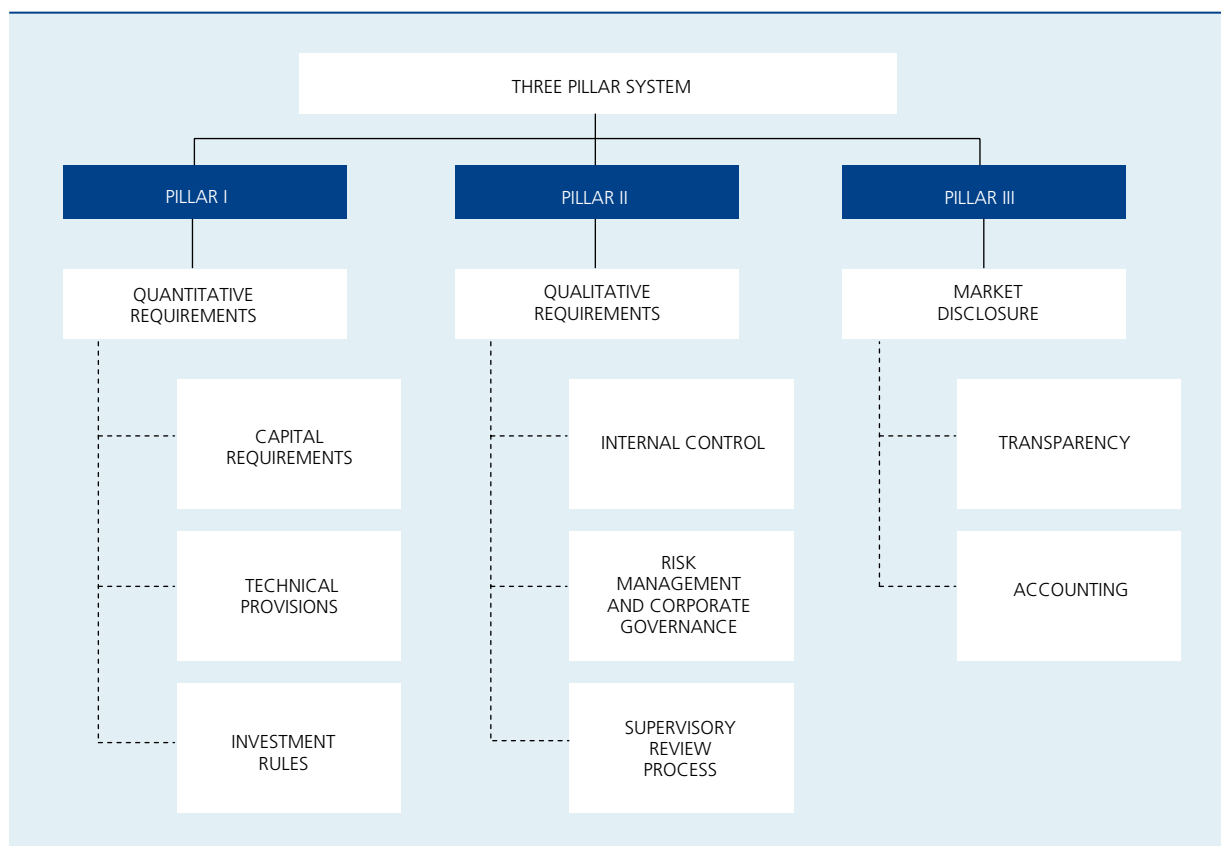
Pillar I covers the so-called quantitative requirements, i.e. those calculated using available actuarial and mathematical methods. It includes a new approach for the calculation of the capital requirements, which will be split into a Minimum Capital Requirement (MCR) and a Solvency Capital Requirement (SCR). It also harmonises the calculation of the technical provisions and includes revised rules on insurance companies' investments.

Pillar II includes the non-quantitative (or qualitative) requirements, which cover the aspects of solvency that cannot (fully) be quantified or deserve additional attention. The supervisory review process deals with insurance companies' governance, risk management structures, internal control and ALM techniques. Supervisors will also assess the methodology applied by insurance companies for the calculation of their capital requirements. The supervisory authority evaluates these elements in the light of the nature of the business of the insurance company and its available financial resources, and will impose additional capital requirements if deemed necessary. Pillar II will also introduce a peer review procedure for supervisory authorities, in order to promote the harmonization of supervisory practices within the EU.

(1) The required margin is increased by 50 p.c. for the insurance classes 11, 12 and 13 listed in point A of the Annex to Directive 2002/13/EC. It concerns in particular certain risky classes of business, such as general liability insurance in aviation.

CHART 1

THREE PILLAR STRUCTURE OF THE SOLVENCY II FRAMEWORK



Pillar III aims at enhancing market discipline by setting requirements regarding the transmission of information towards the public, and introducing the use of new international accounting standards.

2.2 Solvency II development process

Unlike Basel II, Solvency II applies only to the EU Member States and the other three members of the European Economic Area, i.e. Iceland, Lichtenstein and Norway.

The Solvency II project was divided into two phases. In the first phase, which started in May 2001 and was completed by the end of 2004, the structure of the EU insurance market was investigated and the main characteristics of the project were set out, along with the range of possible principles on which the future supervisory system could be based. In the second phase, the Framework Directive and its implementation measures are being developed.

Solvency II is the first insurance directive to be developed under the Lamfalussy procedure. This procedure, which was originally designed for the securities sector and aims at simplifying and speeding up the complex and lengthy

regular EU legislative process by means of a four-level approach, was extended to the entire EU financial sector in December 2002.

Under the Lamfalussy procedure, the legislative process has been split into the development of a Framework Directive by the European Commission (called level 1 measures), and the elaboration of implementation measures supporting the Framework Directive (called level 2 measures) by the European Insurance and Occupational Pensions Committee (EIOPC, the counterpart of the European Banking Committee in the banking field) and CEIOPS. Given the complexity of the Solvency II project, CEIOPS will be involved in the entire development of the new prudential framework, by contributing to the preparation of the Framework Directive, by assisting the European Commission in the preparation of potential implementing measures, and later on, by issuing any consequent supervisory measures (level 3 measures).

As in the case of the banking Capital Requirements Directive, the publication of the Solvency II Framework Directive will be preceded by detailed quantitative impact studies (QIS). The goal of these QIS is to estimate possible economic consequences of the new regulation on

the insurance industry and to assist in the design and the calibration of the new solvency requirements. At present, the results of the first QIS, on the technical provisions, are already available (see Section 3.1 for the Belgian results), while the second QIS, which studies the impact of possible changes in the valuation of both assets and liabilities as well as a number of options for setting the capital requirements, is underway. To supplement the inputs from the QIS, the European Commission will also perform an Impact Assessment. This is a wider analysis on the consequences of Solvency II for the EU financial markets.

The European Commission is planning to issue the Framework Directive in the second half of 2007 and the framework is expected to enter into force by 2010 or 2011.

3. Quantitative requirements under the first pillar of Solvency II

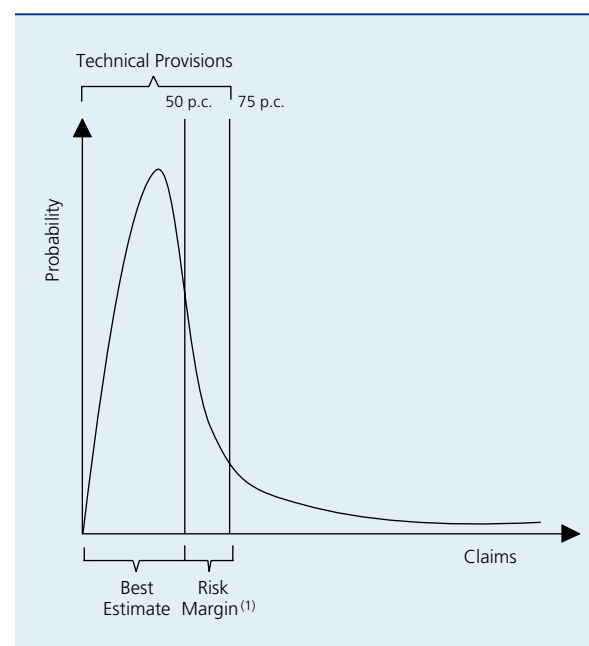
The first pillar of Solvency II replaces the current solvency margin system by risk-based quantitative requirements. It modifies the approach for the valuation and estimation of the technical provisions, introduces a MCR and a SCR and changes the rules regarding insurance companies' investment policy.

3.1 Technical provisions

As already mentioned, insurance companies agree to cover potential future claims related to specified insured events in exchange for a fixed premium paid in advance. The ensuing liabilities of insurance undertakings towards the policyholders are thus uncertain and are reflected in the technical provisions. Solvency II will introduce fair value techniques to bring the valuation of these provisions more in line with their fair value. These techniques are consistent with the market oriented approach of Solvency II and the future version of the international accounting standard for insurance contracts (IFRS 4 phase II).

The fair value method developed by the International Accounting Standards Board (IASB) aims at a realistic valuation of assets and liabilities as the amount for which the assets could be exchanged, or the liabilities settled, between knowledgeable, willing parties in an arm's length transaction. The application of this fair value technique for valuing life insurance liabilities will, however, create difficulties as there is in general no market for exchanging such policies once they are issued by insurers. In these cases, their fair value will have to be estimated.

CHART 2 TECHNICAL PROVISIONS: BEST ESTIMATE AND RISK MARGIN



(1) The first quantitative impact study tested confidence levels for the technical provisions of 60 p.c., 75 p.c. and 90 p.c.

The main component of this fair value is the best estimate of the present value of the future cash flows from the contracts concluded. However, in order to obtain the fair value, the best estimate will have to be increased by a certain margin, as a knowledgeable independent buyer is expected to require a premium for risk and uncertainty above the best estimate in order to be willing to accept the relevant liabilities. This premium is called the market value margin. One of the key discussions in Solvency II is on an appropriate approach for introducing such a margin, which, at the same time, provides sufficient security for policyholders and is market-consistent. A number of solutions are currently being investigated.

One solution is to introduce a margin for risk and uncertainty which makes use of a predefined confidence level to indicate the probability with which an insurance company has to be able to fulfil its obligation towards policyholders in the period up to the expiration of the last contract (Chart 2). The required confidence level will ultimately have to be chosen on the basis of the results of the QIS, in which levels of 60 p.c., 75 p.c. and 90 p.c. have already been tested.

However, according to some market participants and supervisors, this approach is not market-consistent and might unnecessarily incorporate an additional layer of prudence in the valuation of the liabilities (as all risks should

be identified and incorporated in the capital requirement). They also argue that, if it is decided that prudence should be introduced in the valuation of insurance liabilities, to take into account uncertainty in the determination of the market value margin, this would be better dealt with by the capital requirements (see below).

A method that accommodates these concerns is the cost of capital approach, proposed in the Swiss Solvency Test. According to this approach, the additional risk margin would equal the hypothetical cost of capital necessary to run off all the insurance liabilities, following financial distress in a company. The argument is that a knowledgeable, willing party will only agree to take over an insurance portfolio if the cost of capital associated with this portfolio is included in its value.

A rough idea of the impact of the introduction of these new valuation methods for insurance companies' liabilities is provided by the results of the first quantitative impact study. This study, of which the detailed results are published by the Commission Bancaire, Financière et des Assurances (CBFA) for Belgium and by CEIOPS for the entire EU, has tested the level of prudence in technical provisions under several hypotheses. The tests were based on individual firm data as at the end of 2004, representing, in the case of Belgium, about 60 p.c. of the total market in life insurance and 50 p.c. in non-life insurance. However, the methods applied by individual companies were not necessarily fully comparable and not all companies provided all information, as a result of which the aggregates provided below are not always internally consistent. They should be interpreted with caution and can only serve to provide a rough estimate⁽¹⁾.

The exercise revealed that in most cases the best estimate of the technical provisions is lower than the current level (Table 1). Adding a risk margin does not seem to have a large impact on the level of the provisions. For life insurance, the best estimate of the liabilities, including the provisions for future bonuses, amounts to 90.2 p.c. of the current level of the provisions, which do not include these bonuses. This lower level is mainly attributable to the fact that future cash flows of long term liabilities would be discounted at higher rates compared to the technical interest rates currently used in the calculation of the technical provisions. Adding a risk margin to obtain a confidence level of 90 p.c. would only increase the provisions to 93.5 p.c. of their current level.

TABLE 1 IMPACT OF THE INTRODUCTION OF MARKET BASED VALUATION ON THE LEVEL OF BELGIAN INSURANCE COMPANIES' TECHNICAL PROVISIONS⁽¹⁾

(Percentages of the effective level of the technical provisions at the end of 2004)

	Best estimate	75 p.c. confidence level	90 p.c. confidence level
Life insurance ⁽²⁾	90.2	91.6	93.5
Non-life insurance ⁽³⁾			
Undiscounted	82.0	84.7	n.
Discounted	74.2	76.6	79.1

Source: CBFA.

(1) Data gross of reinsurance.

(2) Including provisions for future bonuses.

(3) Both premiums and claims provisions.

In non-life insurance, the best estimates of the liabilities are provided both on an undiscounted basis, as is currently the case in Belgium, and on a discounted basis, which is more market-consistent. The undiscounted best estimate amounts to 82.0 p.c. of the current level of the provisions, while the discounted value would equal 74.2 p.c. of the current level. The impact of discounting is thus significant. The addition of a margin in order to obtain a 90 p.c. confidence level would increase the discounted provisions to 79.1 p.c. of their current level.

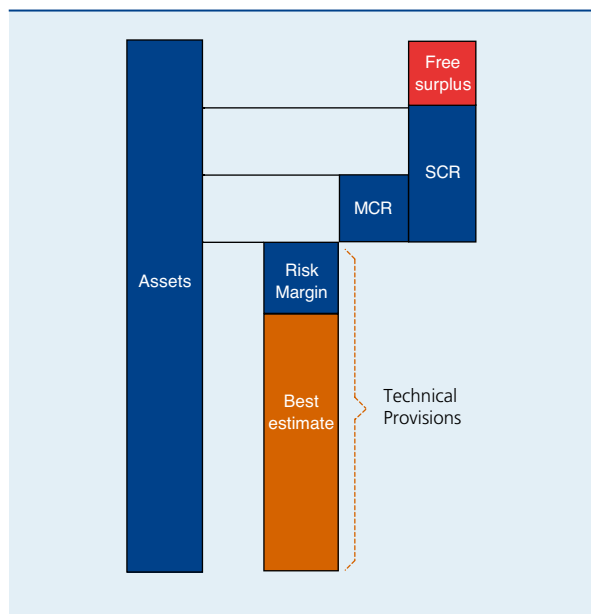
Compared to the European average, the current level of provisions of Belgian insurance companies seems to be somewhat more conservative, in both life and non-life insurance. However, there are large differences between countries.

3.2 Minimum Capital Requirement and Solvency Capital Requirement

On top of the technical provisions, Solvency II introduces two capital layers, called the Minimum Capital Requirement (MCR) and the Solvency Capital Requirement (SCR) (Chart 3).

Note that the capital requirements differ from the provisions in terms of their scope and time horizon. While provisions serve to cover the expected liabilities towards policyholders, increased by a margin for risk and uncertainty, the capital requirements provide a buffer against unexpected losses (tail risks). These losses do not only include unexpected insurance losses, but also the losses resulting from the materialisation of other types of risks.

(1) For detailed information on the methods of calculation and the caveats of the exercise we refer to Commission Bancaire, Financière et des Assurances (2006).

CHART 3 INSURANCE COMPANIES' CAPITAL BUFFERS
AND TECHNICAL PROVISIONS

In addition, provisions and capital requirements differ in their time dimension: provisions cover the claims up to the expiration of all policies, while capital provides a buffer against losses within a period of one year.

The distinction between two capital levels is related to the characteristics of the insurance business, where solvency problems can be resolved over a longer period of time than in the banking sector. Given the long duration of their contracts, insurance companies face lower liquidity risk and have a longer time span in which to address solvency problems. This allows more gradual supervisory intervention. Such an approach is not possible in banking, where high liquidity risk and the risk of loss of confidence and bank runs in the event of solvency problems require immediate, decisive supervisory action.

The following discussion of the capital requirements is based on the most recent information available. It includes the options envisaged in the second quantitative impact study, which deals with the MCR and the SCR. However, it is clear that the results of this exercise and further discussions may still alter the design of the capital requirements.

3.2.1 Minimum Capital Requirement

The MCR is intended to provide a safety net. This means that, on an ongoing basis, the MCR does not necessarily reflect an adequate level of capital, but a level below which the capital of a company cannot fall without

causing an unacceptable risk to policyholders. Therefore, if an undertaking's capital drops below the MCR, the supervisory authority is obliged to react immediately using the most severe supervisory tools, including the withdrawal of the company's licence. The supervisory action in this case is immediate and rule-based. The MCR is the ultimate prudential level and will in general be lower than the SCR. It is, however, subject to an absolute minimum, expressed in euros, similar to the minimum guarantee fund in the present framework.

The MCR is an essential part of prudential supervision under the future Solvency II framework. It provides an EU-wide harmonised, standardised formula applying to all insurance undertakings. The MCR should not be calculated using internal models, since the capital requirements based on these models might differ considerably from one company to another according to the assumptions used, which is found undesirable for the bottom capital level. Moreover, the calculation of the MCR should be robust and transparent in order to minimise compliance costs.

The MCR could, according to CEIOPS' response to the Commission's Call for Advice number 9, be calculated on the basis of the SCR standard formula. Such a method would be fully integrated into the new risk-based framework and would be consistent with the overall prudential objectives of the new regime. However, the feasibility of this approach depends entirely on the robustness of the SCR standard formula. Therefore, if this approach is adopted, a transitional period between the introduction of the SCR and the adaptation of the MCR is suggested.

In this transitional phase, it is envisaged to use a formula based on the Solvency I requirements to calculate the MCR. The MCR could, for instance, equal half of the current solvency requirement. Such a method will, however, need to reflect the new methods of valuing assets and liabilities. Although this approach is simple and is expected to reduce compliance and transition costs for insurance companies, it is not fully consistent with the philosophy of Solvency II.

In the final stage, the calculation of the MCR on the basis of the SCR standard formula may take different forms. One possibility is to set the MCR to a certain fixed percentage of the SCR. Another option would be to use a simplified version of the standard SCR formula, concentrating on the most important risk categories, possibly applying a more straightforward aggregation technique, and calibrated to a lower level of prudence than the SCR.

3.2.2 Solvency Capital Requirement

The SCR reflects the capital level an insurance company needs to maintain in order to have a sufficiently low risk of failure. The SCR is therefore the level of capital deemed required for the insurance market to function safely. It corresponds to the level of capital that enables an insurance company to absorb significant unexpected losses over a one year time horizon and gives reasonable assurance to policyholders that payments will be made as they fall due. This “reasonable assurance” will be provided by the use of a certain confidence level. Currently, a level of 99.5 p.c. is envisaged. It means that the probability that a company will be able to absorb unforeseen losses without falling insolvent within a one-year time period is 99.5 p.c.

Compared to the MCR, the SCR is a more flexible control instrument. It means that once a company's available capital falls below the SCR, the supervisor can choose from a number of suitable tools to urge the company to increase its capital within a reasonable time horizon, for instance the request of additional information, the establishment of a financial recovery plan or possibly also a prohibition on underwriting new business.

Solvency II provides for two possible calculation methods for the SCR: one using a standardised formula and one based on insurance companies' internal models. Both methods allow for the calibration of the capital requirements in accordance with an undertaking's risk profile. Box 1 provides more information on both calculation methods.

Box 1 – Calculation of the Solvency Capital Requirement

Just as in Basel II for banks, the SCR can be calculated using either a standardised formula or the company's internal models. While the first method is less flexible and cannot fully capture the real risk profile of each individual company, it simplifies the calculations and entails lower compliance costs. Although such a method might remain appropriate for simple companies with an average risk profile, it does not capture the real risk profile of complex companies with very specific activities, for which the use of internal models should be the norm. To encourage effective risk management, the SCR will take account of reinsurance and other forms of risk mitigation techniques.

Standardised approach

The standardised approach will apply a relatively simple formula. It will relate capital requirements to each risk category, which will then be combined in an overall capital requirement. For these calculations, a factor-based approach, whereby capital requirements are obtained by applying fixed percentages to a range of balance sheet or income statement items, will be used.

It is clear that the standardised calculations will not be able to fully reflect each individual company's risk profile. For instance, they will not capture the links between assets and liabilities and non-linear effects such as non-proportionate reinsurance, options or guarantees. Therefore, it is proposed, especially in life insurance, to use scenario analyses to supplement the factor-based calculation.

The robustness and reliability of the standard formula will depend, to a great extent, on the methodology used in its construction. One method would be to set a capital requirement for each risk separately. In such a bottom up approach, the different capital components have to be combined into an overall requirement, whereby the diversification effects across risk factors will have to be taken into account. This requires a good understanding of risk dependencies. The results of the quantitative impact studies will be used to calibrate these calculations.



Internal models

The alternative SCR calculation method uses insurance companies' internal models. These should better reflect the business profile of an undertaking, and thus, allow to better calibrate the regulatory capital according to the real capital needs. The implementation of such internal models requires a much more sophisticated actuarial approach as well as highly developed risk management structures. Therefore, these models will have to be validated by the regulator on an individual basis.

As in banking, the application of internal models requires that supervisors adopt a much more individualised approach to supervision, for instance for the validation of their internal models. This will require the availability of highly qualified staff.

Solvency II might permit more comprehensive use of internal models than Basel II, as it aims at allowing insurance companies to base the calculation of their capital requirements entirely on their internal models. Currently, Basel II only allows the capital required for market and operational risks to be calculated solely on the basis of internal models. For the most important risk factor, credit risk, this is not the case, as the internal ratings-based approach only allows banks to generate themselves the parameters needed in the calculation of the required capital, while the formula for the calculation itself is prescribed by regulation.

Supervisors may, under Pillar II, require insurance companies to hold an additional amount of capital. This decision will be taken at an individual level and be based on the supervisory review process. This increased capital requirement will be called the adjusted SCR.

Solvency II will also include new specifications regarding the categories of balance sheet items that will be eligible as capital to meet solvency requirements. These new rules will ensure compatibility with other financial sectors and take into account recent capital market developments. Insurance companies may, of course, choose to hold more capital than required by regulation for a number of reasons, e.g. to obtain a certain rating, to finance growth or to signal their shareholders' commitment. This additional capital corresponds to the free surplus in Chart 3.

3.3 Investment policies

One of the main weaknesses of the current solvency framework for European insurance companies is that the rules governing the assets used to cover technical provisions and regulatory own funds are not fully harmonised. This sometimes results in different local interpretations, potentially leading to unfair competition. In addition, due to recent developments in financial markets, it is not clear whether or not insurers may invest in a range of new financial instruments.

Solvency II will therefore introduce new rules on the investment policy adopted by insurance companies. It is proposed that the assets covering the technical provisions, the SCR and the MCR are subject to the same rules.

However, the form of those investment policy rules remains uncertain. A combination of three types of requirements is envisaged to deal with investment risk. First, investment risk will be incorporated in the SCR (see above). Second, Solvency II will most likely provide eligibility criteria for assets covering the technical provisions and the capital requirements, and impose quantitative limits on asset concentrations both to single asset classes and counterparties. The eligibility of assets may be determined either on the basis of a prescribed list of acceptable (or unacceptable) categories of instruments, or by outlining the characteristics that assets must (or must not) possess (i.e. principle based), or perhaps by using a combination of both methods. Third, Solvency II will, as part of its second pillar, provide qualitative requirements on the appropriate management of assets and liabilities and a prudent investment policy. This combination of qualitative and quantitative requirements would be referred to as the "Prudent Person Plus" approach.

Here too, in the context of the supervisory review process, supervisors will perform a qualitative evaluation of an undertaking's investment and ALM strategies, including the approach to diversification, and, if need be, could increase the capital requirements.

Conclusions

The new Solvency II framework for insurance companies is clearly inspired by the Basel II framework for banks. Thus, it will adopt the same three pillar framework and introduce the use of internal models in the calculation of the required capital. The similarities essentially stem from the fact that both pursue the same goal: they aim at adapting the solvency system of banks and insurance companies to the new market environment and improving its alignment with the real risk profile of the individual companies.

There are, however, important differences between the two frameworks, which follow from the inherent differences between the two types of business. Solvency II includes detailed rules on the calculation of technical provisions, which represent by far the main category of liabilities for insurance companies. It also introduces specific rules governing the categories of assets in which insurance companies may invest. In addition, the capital requirements are mainly focused on underwriting risk in insurance and on credit risk in banking. Another striking difference is the presence of two capital layers in Solvency II

and only one in Basel II. This reflects the different time dimension of the two types of business: whereas banks' very liquid liabilities call for immediate intervention if their financial situation deteriorates, the long term nature of insurance companies' liabilities allows a more gradual approach.

One has to bear in mind that this presentation of Solvency II is still provisional. Although the main characteristics have already been decided, a lot of issues are still under discussion. In the coming months, the European Commission, the EU Member States and market participants will continue their discussions on the Framework Directive. In this connection, the European Commission has requested additional advice from CEIOPS on pillar I issues, such as the valuation of technical provisions, the shape of the SCR and the MCR formulas, and the recognition of reinsurance and other risk mitigation techniques. In order to be able to incorporate the view of market participants in its advice to the Commission, CEIOPS will, in the second half of this year, issue new consultation papers on these and other issues. At the same time, CEIOPS will continue to work on the implementation measures and, subsequently on the supervisory measures.

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