Financial Stability Review 2004

National Bank OF BELGIUM

Eurosystem

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Contents

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

One of the key implications of the globalisation of the financial system is that market participants are reacting much more quickly than in the past to common sources of information. This increases the risk of occurrence of collective behaviour which, however justified at an individual level, could create systemic problems once adopted simultaneously by a large number of institutions. In this new environment, there is a growing need to complement micro-prudential surveillance, focused on the resilience of individual financial institutions, with macro-prudential analysis, which endeavours to detect more general developments liable to weaken global financial stability.

In Belgium, the co-ordination and integration of those two specific approaches will be greatly facilitated by the recent institutional links created between the central bank and the supervisory authority. In the last twelve months, those institutions have become more closely interconnected. On the one hand, the Banking and Finance Commission and the Insurance Supervision Office have been merged into the Banking, Finance and Insurance Commission (BFIC). On the other hand, a Financial Stability Committee has been established, bringing together members of the boards of the National Bank of Belgium and the BFIC in order to better organise functions of common interest such as the co-ordination of crisis management or the launching of a business continuity plan.

While contagion mechanisms within the financial system may give the impression of unfolding very rapidly, they are often the final stage in a process which has been gradually building up, sometimes for quite a long time. This sequence of events illustrates the importance, but also the difficulty, of the preventive role of macro-prudential analysis. The general overview of financial conditions presented in the first part of this Financial Stability Review (FSR) addresses this issue. The major threats to the stability of the system seem to have been receding recently. However, it is precisely in this better, apparently more benign, environment that financial institutions usually become less alert to risks. The best way to prevent the materialisation of risks is to closely monitor the system and to encourage market participants to implement efficient risk management instruments and procedures.

All the same, risks are inherent in the activity of banks. A compromise has to be found between supervisory authorities' concerns for financial stability and shareholders' objectives. Within each financial institution, the appetite for risk may also differ between shareholders and managers. A good mechanism of checks and balances has to be established between supervision, regulation and corporate governance of banks. The frame in which this delicate exercise has to be conducted is described in a first thematic article of this FSR.

The four other articles can be subdivided into two groups, devoted to two main categories of risks incurred by banks, i.e. credit risks and interest rate risks.

Traditionally, the bank lending relationship has been characterised, in Belgium, by a high degree of continuity. Most corporations rely on a very limited number of credit institutions as their source of external finance. By establishing those long-term stable relationships with their corporate clients and, in particular, with small and medium-sized enterprises (SMEs), Belgian banks are in a position to reduce the specific asymmetric information problems in credit relations with small firms. An article in this FSR tries to detect whether there have recently been some structural changes in the Belgian banks' corporate loan market and, more specifically, which are the main variables that could determine the number of relationships initiated by SMEs.

At the same time, larger corporations are increasingly turning to market financing as a potential substitute for bank loans. The issuance of corporate bonds and commercial paper is growing, while banks themselves may take advantage of those new markets to off-load part of their credit book through securitisation or the use of credit derivatives. As a consequence, financial markets have access to new pricing indicators, as credit spreads are now available for a wider range of risks. However, even within a given category of credit rating, those spreads are not fixed but may be subject to quite large fluctuations. A third paper tries to measure empirically which are the main determinants of those variations.

Given the importance of the banks' maturity transformation activity, it is a significant point that interest rate risks are only very partially covered by capital requirements. In line with Basel I practices, Basel II will only impose formal constraints on interest rate risks originating from the trading book. Indeed, there are no internationally agreed formal capital requirements with respect to the interest rate risk in the banking book, partly because of the difficulty of quantifying the embedded options in the deposit accounts which finance a substantial portion of the banks' intermediation activities. This does not imply that those risks are not monitored. Supervisors have developed a number of off-site tools that are used as a detection device and which can, if necessary, trigger more detailed on-site inspections. This individual assessment, by national supervisors, of the interest rate risk profile of each institution, will be part of the second pillar of Basel II. The problems faced in the measurement of interest rate risks and the instruments used by supervisory authorities are analysed in a fourth article.

Individual institutions themselves have adopted sophisticated interest rate risk management techniques through their asset and liability management (ALM) procedures. They resort, in particular, to various hedging mechanisms, be it for individual positions or at a more global level, with so-called macro-hedging. The procedures for the use and reporting of those instruments will be strongly affected by the new International Accounting Standards (IAS) accounting system, which will have to be implemented for all Belgian banks' consolidated accounts. In particular, the IAS 39 standard will introduce new valuation rules, one purpose of which is to put derivative products on banks' balance sheets. Although this standard is not yet completely finalised, major banks are already actively preparing for its implementation. The last article of this FSR illustrates, with the help of a concrete example, how a bank could smooth the impact of the new rules on the volatility of its results without modifying its ALM position.

Brussels, June 2004

Executive Summary

1. Overview

While the Overview Article mainly concentrates on recent developments in the financial position of Belgian households and non-financial corporations, and on the soundness of the Belgian credit institutions and insurance companies, the economic and financial environment in which these economic agents operate is highly dependent on international developments. This applies to the real sector, as Belgium is very open to international trade and, so, quite sensitive to changes in the growth performance of its main trading partners. It is also true for the financial sector as it is highly integrated into European (and global) money and capital markets.

In this perspective, international developments were quite supportive for the Belgian financial system during the period under review (June 2003 - May 2004), as low interest rates and stronger global economic growth set the stage for firming equity prices and a further narrowing of risk premia on corporate and emerging market bonds. The overall rate of growth in Belgium remained nevertheless quite weak and the buoyancy of financial markets is increasingly tempered by changing expectations about the speed and magnitude of a return to a more neutral monetary policy. As a result, long-term interest rates and risk premia in certain markets have shown a tendency to increase again.

While one of the main potential stress scenarios for the global financial system in the future could therefore consist in a significant further upward adjustment in long-term interest rates – with potential repercussions on the prices of other financial assets –, these adjustments are occurring in the context of a further strengthening and broadening of the global economic recovery. Provided that the process is correctly anticipated and managed by financial markets and institutions, the expected transition towards less ample liquidity conditions in the period ahead therefore does not necessarily have to be disruptive for global financial markets, although the associated risks should be monitored closely.

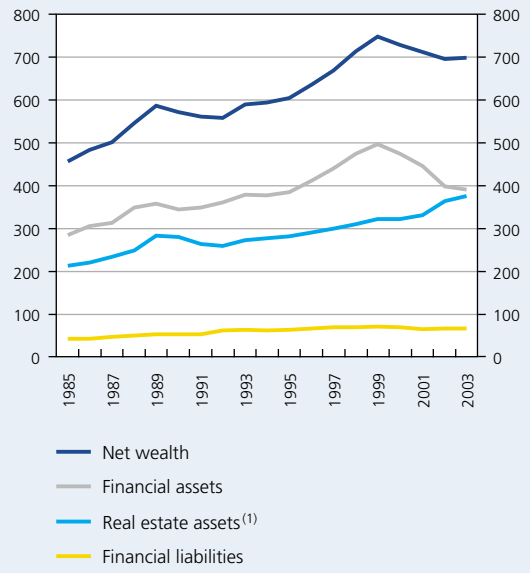
1.1 Financial position of Belgian households and non-financial corporations

Notwithstanding a moderate rate of real GDP growth (1.1 p.c.), the balance sheet of Belgian households remained very strong in 2003, as their net wealth stabilised at about seven times their annual disposable income (Chart 1).

Following a significant decline between 1999 and 2002 – as a result of substantial mark-downs in the market value of equity holdings –, households' financial assets stabilised last year at about four times disposable income, but some further major changes occurred in the composition of this asset class. The share of outstanding claims on institutional investors, which include investments in life insurance products, mutual funds and pension funds, continued to grow (to about 36 p.c.), on the back of strong net inflows into mutual funds with capital protection and life insurance products with minimum guaranteed rates of return. The preference for low-risk assets, in combination with attractive yields offered by banks on (tax favourable) regulated savings accounts, also fostered further growth in bank deposits. Yet, as it was offset by a continuing structural decline in the outstanding amount of bank bonds ("kasbons" ; "bons de caisse"), the share of households' claims on banks remained broadly unchanged at 37 p.c. of their total financial assets.

CHART 1 DEVELOPMENTS IN BELGIAN HOUSEHOLDS' BALANCE SHEET

(Percentages of gross disposable income)

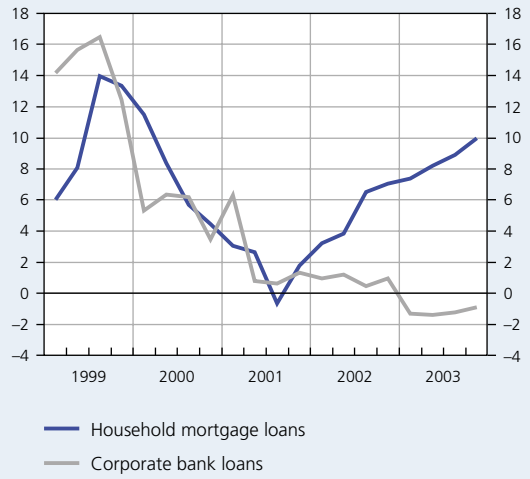


Sources : NSI, Rademaekers and Vuchelen (1998), Stadim, NBB.

(1) For the years up to 1997, the stock of households' real estate assets, at market values, 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 2 BANK LENDING TO BELGIAN HOUSEHOLDS AND CORPORATES

(Percentage changes in outstanding amounts compared to the corresponding quarter of the previous year)



Source : NBB.

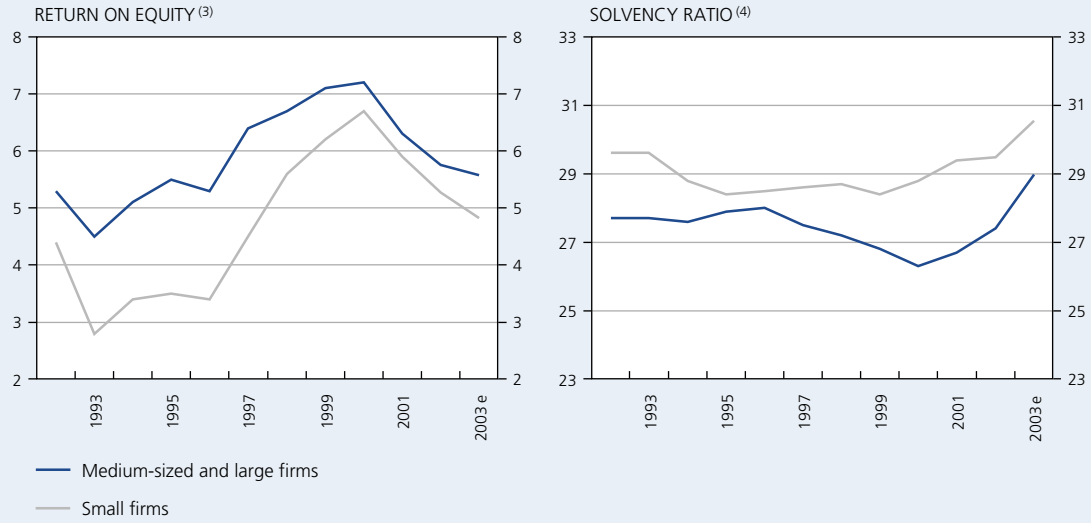
Although the overall pace of housing price inflation since 1995 puts Belgium in an intermediate position between countries experiencing falls in housing prices (Japan and Germany) and countries experiencing very large gains in housing prices (including Ireland, the UK and Spain), strong capital gains on housing and other real estate assets in recent years have lifted the relative share of this asset class in households' total assets towards 50 p.c. Annual growth in the price of houses and building plots averaged respectively 7.8 p.c. and 13.9 p.c. in the period 2002-2003, when the growth of the stock of outstanding mortgage loans accelerated from 2 p.c. to 10 p.c. (Chart 2). In this connection, an analysis of recent developments in mortgage borrowing suggests that lower nominal interest rates – and to a lesser extent new mortgage products – have underpinned a steady increase in the average size of new mortgage loans in recent years. Notwithstanding these developments, the aggregate level of indebtedness of Belgian households remains quite low as a percentage of disposable income (66 p.c.) or as a share of total assets (8.5 p.c.) in comparison with the levels registered in a number of other countries.

In contrast to the buoyant growth that characterised households' mortgage borrowing, the pace of corporate lending remained lacklustre in 2003, extending the downward trend that started in 1999. While hardly surprising in a context of weak economic activity, another factor that depressed the demand for corporate loans was the increasing reliance of Belgian non-financial corporations on issues of securities for their debt financing. Following two consecutive years during which the net amount of new bank loans was lower than the net funds raised through issues of debt securities, the outright substitution between the two sources of finance in 2003 in fact reinforced an existing trend that has lifted the share of debt securities in total financial debt to about 23 p.c. in 2003, up from 11 p.c. in 1994.

As concerns the leverage in the corporate sector's balance sheets, the results from a sample of Belgian non-financial corporations for which the Central Balance Sheet Office already has annual accounts for 2003 suggest that the solvency of the median small and large Belgian firm further improved last year, extending the upward trend that started in 2000-2001 (Chart 3). The return on equity, in contrast, was still affected by the weak economic environment, and declined for the median small and large firm from respectively 5.3 and 5.8 p.c. in 2002 to 4.8 and 5.6 p.c. in 2003. This decline in profitability helps explain the further increase in the number of bankruptcies. However, the total assets involved in bankruptcy proceedings fell in 2003 and the first quarter of 2004.

CHART 3 KEY INDICATORS FOR BELGIAN NON-FINANCIAL CORPORATIONS [1]

(Median observations [2], percentages)



Source : NBB.

(1) A company is considered as 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 2003 are calculated by applying to the 2002 medians the percentage of variation observed in the constant sample.

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

(4) The solvency ratio is calculated as own funds divided by balance sheet total.

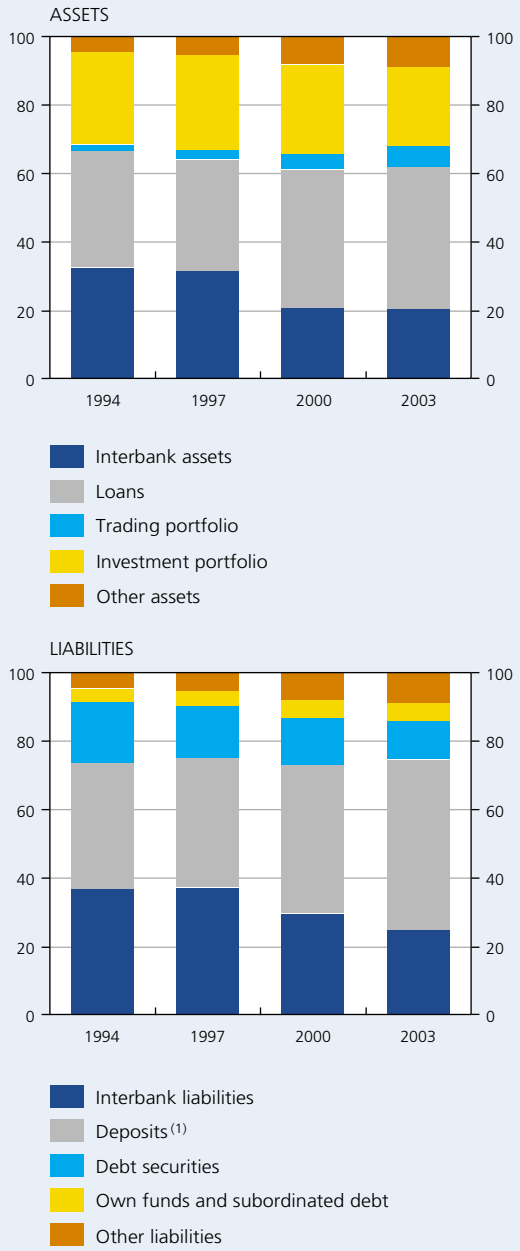
1.2 Banks

Notwithstanding the above-mentioned substitution between intermediated and non-intermediated debt financing, Belgian banks' loans to domestic non-financial corporations still represent a large share of their total assets. As shown in Chart 4, the relative importance of loans (which also include loans to households) as an asset class in the balance sheet of Belgian banks has risen to over 40 p.c. of total assets, while 10 years ago, they accounted for some 30 p.c. While the main counterpart of this rising weight of loans on the assets' side has been the downsizing of interbank claims, a similar fall in the relative share of interbank funding on the liabilities' side was compensated by higher customers' deposits. While underscoring the key role which Belgian banks still perform in the intermediation of savings into loans, these substantial stocks of loans and deposits also highlight the importance of analysing Belgian banks' exposures to credit risk and maturity transformation risks.

As concerns the risks related to banks' loan and securities portfolios, Chart 5 shows that, after a sharp increase in 2002, Belgian banks' value adjustments and provisions for non-performing assets decreased somewhat in 2003, thanks mainly to a fall in the net value corrections on the securities portfolio. While the depressed conditions of 2002 had forced banks to book significant value adjustments on their equities portfolio, the upturn on stock markets allowed them to reverse part of those provisions in 2003. Although they show large fluctuations, value reductions on the securities portfolio still remain, on the whole, much smaller than the ones on the loan book. The latter decreased slightly in 2003, but on a consolidated basis, with a level of around 40 basis points of total loans, they remained well above the average of around 30 basis points recorded in the period from 1997 to 2001.

CHART 4 BALANCE SHEET STRUCTURE OF THE BELGIAN BANKING SECTOR

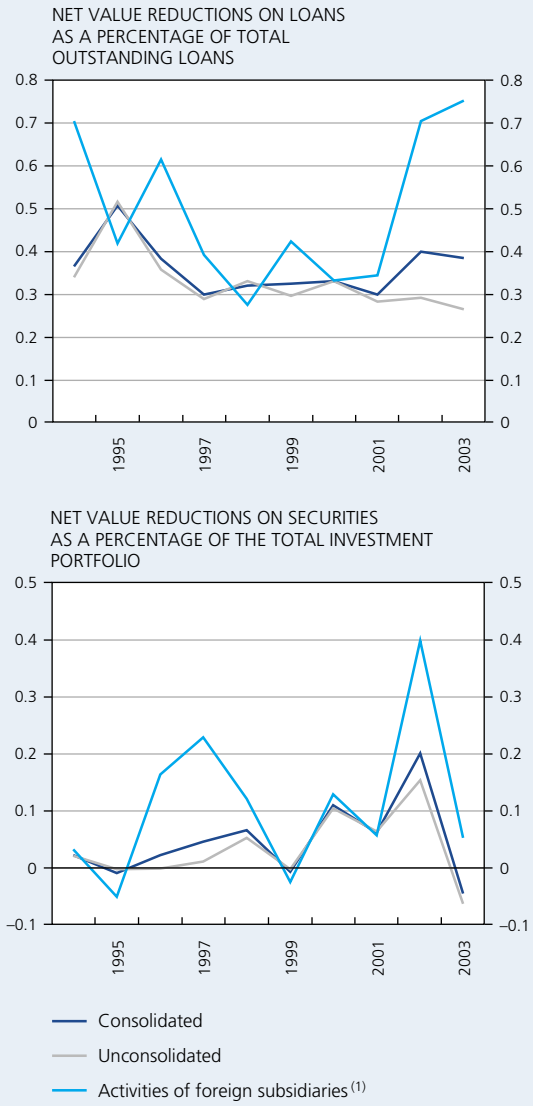
(End of year consolidated figures, percentages of total)



Sources : BFIC, NBB.

(1) Sight, savings and term deposits, as well as other non-securitised debts towards clients.

CHART 5 VALUE ADJUSTMENTS ON AND PROVISIONING FOR NON-PERFORMING ASSETS



Sources : BFIC, NBB.

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

In this connection, it is also striking to observe that this upward trend seen in the consolidated figures is not reflected in the unconsolidated accounts. The difference between the two accounting bases provides a good approximation of the provisions which have had to be recorded for activities of foreign subsidiaries. Those provisions were much higher in 2002 and 2003 than during the preceding years.

This is not the first time that Belgian banks have had to constitute higher provisions on some of their foreign loans. As illustrated by the upper panel of Chart 5, this was also the case in 1994, 1996 and 1999. On those three occasions, however, the upswing in the provisions did not contribute towards a substantial gap between consolidated and unconsolidated figures, in sharp contrast with the developments observed in 2002 and 2003.

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

(Figures on a consolidated basis, percentage changes compared to the previous year)

	2000	2001	2002	2003
Net interest income	3.0	4.6	3.2	0.0
Net non-interest income	28.5	–1.2	–11.7	–2.6
Banking income	**15.3**	**1.4**	**–4.6**	**–1.2**
Staff costs	11.7	6.7	–0.5	0.8
Other operating costs	24.9	2.3	–6.3	–4.1
Operating costs	**19.0**	**4.1**	**–3.8**	**–1.8**
Gross operating result	**6.8**	**–5.6**	**–6.9**	**0.1**
Value corrections	–9.6	4.6	36.2	–31.3
Net operating result	**12.3**	**–8.3**	**–20.2**	**15.3**
Consolidated result, part of the group	**50.6**	**–32.1**	**–15.2**	**14.3**

Sources : BFIC, NBB.

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

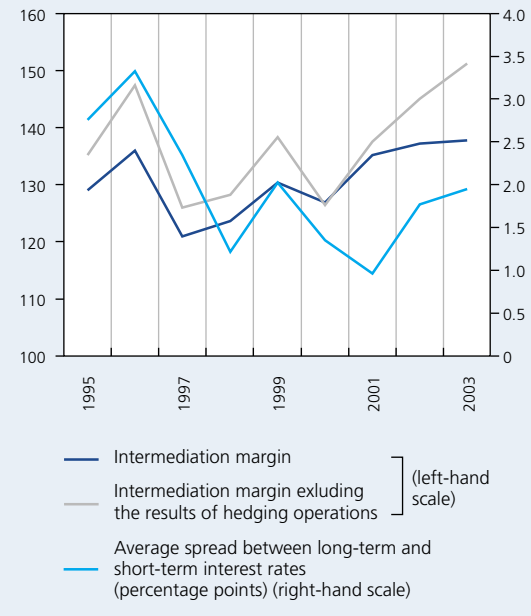
This difference mostly reflects a volume effect. The loan portfolio of Belgian banks' subsidiaries abroad has risen significantly in recent years, increasing the vulnerability of the Belgian banking system to developments in some foreign markets.

As shown in Table 1, the overall reduction in value corrections contributed in no small way to the improvement in Belgian banks' profitability. In fact it was the main factor contributing to the 15.3 p.c. increase in the net operating result in 2003. The gross operating result remained flat, as the decline in operating costs (–1.8 p.c.) was compensated by a 1.2 p.c. decline in banking income. As a consequence, the recent upward trend in the cost-income ratio of Belgian banks has hardly been reversed. In 2003 this ratio levelled off at about 74 p.c., i.e. a much higher level than the minimum of 66 p.c. achieved in 1998.

While the cost reduction is partly the outcome of synergies achieved thanks to the various mergers that took place in previous years, Belgian banks are finding it difficult to enhance their income. Net non-interest income went down for the third consecutive year, mainly reflecting a further decrease in fee generating business. And, notwithstanding a slight improvement towards the end of the year, full year results stemming from intermediation activities were flat in 2003, reflecting subdued corporate lending activity in a lacklustre economic environment.

CHART 6 INTERMEDIATION MARGIN OF BELGIAN BANKS (1)

(Consolidated figures ; basis points, unless otherwise stated)



Sources : BFIC, NBB.

(1) The intermediation margin is calculated as the difference between the implicit interest rate received and paid on interest-bearing assets and liabilities respectively.

The intermediation activity remains by far the major source of revenue for the sector, as it still generates more than 50 p.c. of total banking income. Due to competitive pressures, the interest margin has traditionally been lower in Belgium than in the majority of other European countries. Since 1997, this margin has been widening (Chart 6). Although this is due partly to changes in the composition of assets, with more high margin loans to foreign counterparts and less low spread interbank positions, it also reflects changes in the credit policy of banks, which are aligning prices more closely with risk for the various categories of loans.

While this increase in the intermediation margin was also supported, during the last two years, by a steepening of the yield curve, two factors tended to limit the positive effect in 2002 and 2003. On the one hand, the decline in short-term rates to an historical low has reduced the "endowment" effect, corresponding to the large margin that banks traditionally make on the portion of their sight deposits on which practically no interest is paid. On the other hand, the cost of hedging operations affected the intermediation margin to a greater extent than in recent years.

1.3 Insurance companies

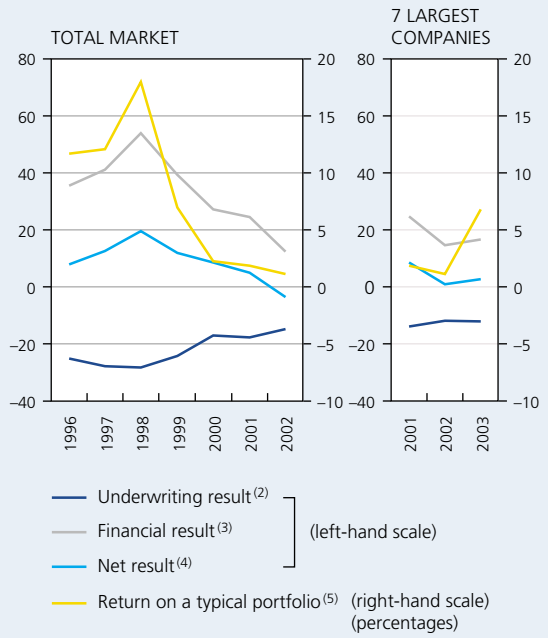
While data are not yet available for the insurance sector as a whole, the unconsolidated annual accounts of the seven largest insurance companies show that the net result of these insurance companies improved slightly in 2003 (Chart 7). This reflected a stabilisation in the underwriting result and a small increase in the financial result.

While accounting rules help explain why the increase in the financial result was much lower than the significant jump in the estimated return on insurance companies' investment portfolios, the positive turnaround in this component of insurance companies' results may have relieved some of the pressures on insurers to achieve a further improvement in underwriting results in 2003. Indeed, notwithstanding the still modest overall net result, the composition of insurance companies' results has returned to a more sustainable situation, compared to the large imbalances that were registered at the end of the 1990s when very high financial results were used to compensate large underwriting losses.

Thanks to the improvement in profitability, the available solvency margin increased slightly in 2003, to 260 p.c of the minimum required margin (Chart 8). The share of the sector's assets held by insurance companies with a solvency level lower than 100 p.c. dropped from 2.6 p.c.

CHART 7 MAJOR COMPONENTS OF BELGIAN INSURANCE COMPANIES' RESULTS

(Percentages of net premiums (1), unless otherwise stated)



Sources : BFIC, Thomson Financial Datastream, NBB.

(1) After premiums paid for reinsurance.

(2) Corresponds to the balance of the technical accounts in life and non-life insurance, excluding the financial results booked in these accounts. Corrected for provisioning as a result of changes in the value of defined contribution insurance contracts.

(3) Consists of the total net financial result, except the net financial income related to changes in the value of defined contribution insurance contracts.

(4) Includes, besides the underwriting and financial results, the balance of the other residuary transactions.

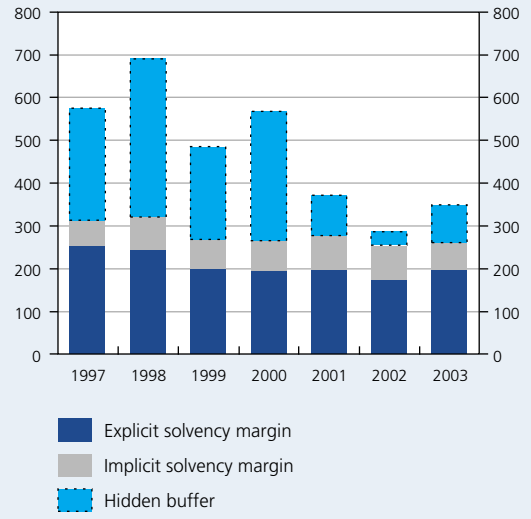
(5) Return on a portfolio with a structure comparable to that of Belgian insurance companies.

in 2002 to below 1 p.c. The composition of the aggregate solvency margin also improved, as the explicit margin – mainly including insurance companies' own funds – rose from 173 p.c. of the minimum required margin in 2002 to 196 p.c. in 2003. The hidden buffer, which consists of the unrealised capital gains that do not form part of the implicit margin, also rose again, after having absorbed the bulk of fluctuations in the market value of insurance companies' investments by declining from 304 p.c. in 2000 to 33 p.c. in 2002.

While the hidden buffer thus clearly benefited from the global financial market recovery in 2003, the currently still low level of long-term interest rates poses a major challenge to insurance companies, especially given the large proportion of contracts with minimum guaranteed rates of return in life insurance. On these contracts, insurance companies, driven by strong competition,

CHART 8 AVAILABLE SOLVENCY MARGIN OF BELGIAN INSURANCE COMPANIES

(Percentages of the minimum required solvency margin)



Sources : BFIC, NBB.

CHART 9 COMPARISON OF THE ESTIMATED AVERAGE GUARANTEED RETURN ON DEFINED BENEFIT LIFE INSURANCE CONTRACTS WITH THE LONG-TERM INTEREST RATE

(Percentages)

Sources: Thomson Financial Datastream, NBB.

(1) Rate on the secondary market for 10-year Belgian government bonds.

(2) For the calculation of the estimated guaranteed return, it was assumed that, while in 1999 all contracts enjoyed a guaranteed return of 4.75 p.c., at the end of 2003 45 p.c. of the outstanding contracts still had a guaranteed return of 4.75 p.c., 40 p.c. one of 3.75 p.c. and 15 p.c. one of 3 p.c. For the period in between a linear interpolation was applied.

(3) 80 p.c. of the average yield of 10-year government bonds on the secondary market over the last five years.

generally offered the maximum allowed guaranteed return, amounting to 4.75 p.c. until 1999, after which it was lowered to 3.75 p.c. More recently, most insurance companies, forced by adverse market developments, again lowered the guaranteed rates for new contracts to around 3 p.c.

Although insurance companies have taken some measures recently to prevent new defined benefit life insurance policies from adding to the already existing burden of life insurance contracts with high guaranteed minimum rates of return, the average guaranteed return on all outstanding branch 21 contracts is estimated at slightly above 4 p.c. (Chart 9).

Whereas long-term interest rates have traditionally been considerably higher than the average guaranteed return, the difference between the two has become structurally narrow, and at some points even negative, since 1998. This renders it more difficult for insurance companies to obtain sufficient investment income to meet the obligations attached to these contracts with guaranteed returns. Yet, insurance companies are obliged to constitute an additional provision in case the guaranteed return exceeds 80 p.c. of the average yield of 10-year government bonds on the secondary market over the last five years; this threshold was 3.94 p.c. at the end of 2003. Higher long-term interest rates could help to alleviate this constraint even if the move towards such a higher level would, in an early phase, lead to losses on the existing bond portfolio.

2. Summary of articles

2.1 Corporate governance, regulation and supervision of banks

Recent corporate crises, such as Enron and Worldcom in the US and Parmalat and Ahold in Europe, have highlighted the importance of sound corporate governance. However, although the governance of banks differs from that of non-financial firms, it has received surprisingly little attention. In banks, debt holders are dispersed and non-experts, which limits the effectiveness of traditional debt governance arrangements. In addition, the high

proportion of debts in total liabilities, and the resulting high leverage, facilitate risk shifting by shareholders. Hence the need arises for a representative of depositors to 'mimic' the role taken by debt holders in non-financial firms, and this role is typically performed by a regulatory and supervisory authority (RSA).

The article takes a banking stability perspective. Features of corporate governance, such as shareholder structures, management incentives and the structure of the board of directors are evaluated with respect to their impact on a bank's risks. To the extent that managers may be more risk averse than shareholders, it may be in the interest of the RSA to put more power in the hands of management rather than of shareholders. However, another concern may be the stability of bank ownership when share ownership is dispersed. In this case, it may be difficult to pressure shareholders to provide additional support to ailing banks in cases of under-capitalisation. These competing concerns raise some trade-offs between various shareholder structures and the relative power of managers vis-à-vis shareholders.

In Belgium, the agreements between the BFIC and banks' main shareholders on the autonomy of bank management (Protocole d'autonomie de la fonction bancaire/ Overeenkomst over de autonomie in de bankfunctie) aims to combine the presence of strong reference shareholders with independent bank management. Negotiated in 1959, the agreement was initially intended to prevent shareholders' intervention in the credit policy of the bank, especially in industrial holding structures. Although past and current developments in the banking sector structure may hinder the application of the agreement, they also highlight the importance of the banking stability concerns underlying the agreement.

2.2 Belgian SMEs and bank lending relationships

In Belgium and in many other countries, banks are important providers of external finance to small and medium-size firms. When credit is widely available for these firms, they can be an engine of economic growth. This paper addresses questions related to the determinants of firms' bank lending relationships and investigates these determinants empirically for small and medium-size Belgian firms.

Using data on firm-bank loan contracts from the Belgian credit register, the paper investigates a number of hypotheses that have been proposed and tested for other countries. In a manner consistent with results obtained in other studies, it emerges that smaller and younger firms tend to have fewer bank lending relationships. This observation provides support for the hypothesis that firms which are more "informationally-opaque" maintain fewer lending relationships. In contrast with results for other countries, Belgian firms with low profitability and financially distressed firms are more likely to have a single bank lending relationship than multiple bank relationships. This result is in opposition to the hypothesis that low profitability firms choose to have multiple bank lending relationships, in order to reduce the probability of having their finance cut off. The result suggests that, whereas low profitability borrowers might like to have multiple bank lenders, banks may be unwilling to extend loans to such firms.

The analysis in this paper provides an illustration of the potential benefits that public credit registers can offer to banks and authorities alike. In addition to providing information to banks about the outstanding credit volumes of potential borrowers, such data also allow regulatory authorities to better understand the lending behaviour of banks and the role that bank finance plays for firms, including the degree of dependence of firms on a single bank lender.

2.3 The determinants of credit spreads

The understanding of the determinants of credit spreads is of major importance to financial institutions, central banks, firms, and regulators for several reasons. First, the US and Euro corporate bond markets have grown significantly in the past decade. The Euro market, which lags its US counterpart, has become broader and more liquid. Second, the market for credit derivatives and structured finance products has also experienced considerable growth over the last decade and is beginning to play an important role in financial markets. Third, central bankers use credit spreads to assess (extract) default probabilities of firms and to judge the general functioning of markets. Finally, credit spreads are often used as a business cycle indicator.

The contributions of this paper are threefold. First, it presents a detailed empirical analysis of the determinants of credit spread changes for different types of Euro corporate bonds between 1998 and 2002. Results indicate that factors suggested by structural credit risk models, such as the level and the slope of the default-free term structure, the stock price, and stock price volatility, significantly affect credit spread changes of Euro corporate bonds. An important finding is that the sensitivities of credit spread changes depend to a great extent on the rating and the maturity of the bonds. Furthermore, liquidity risk is a major determinant of credit spread changes, especially those on lower rated bonds.

Second, the sensitivities of credit spreads to financial and macroeconomic variables are compared for US and European corporate bonds. Although these two markets differ significantly in terms of size and liquidity, empirical results for the two regions are very similar. It emerges that credit spread changes depend more on bond characteristics, such as rating and maturity, than on the country or currency of issuance. Finally, a large component of the dynamics of US and European credit spreads remains unexplained by empirical studies. Several possible reasons for this lack of explanatory power have been put forward, such as liquidity risk, systematic shocks, and diversification risk.

The third contribution of this article is an analysis of diversification risk by comparing simulated loss distributions of portfolios of bonds and/or stocks. The results reveal that the loss distribution of bond portfolios is more skewed to the left compared to equity portfolios. However, the skewness of the loss distribution of mixed portfolios (stocks and bonds) is very similar to that of equity portfolios. This result calls into question the importance of diversification risk for large investors such as financial institutions that have portfolios of bonds and stocks.

2.4 Interest rate risk in the Belgian banking sector

Banks typically finance their assets by means of liabilities with different maturity and repricing characteristics. This transformation activity of banks meets an important need in any economy, but potentially leads to the exposure of a bank's net interest income and market value of equity to unexpected changes in interest rates. Ultimately, banks adopt this strategy because, by lending at a long rate and borrowing at a short rate, they expect to earn an extra return or risk premium which, though unstable through time, should be positive on average.

Estimates are presented for the interest rate risk exposure of the aggregate Belgian banking sector, from both a going concern and a liquidation viewpoint. On average, the ratio of net interest income to total income seems to have declined slowly over the last ten years, reflecting a disintermediation trend. In line with evidence for other countries, it is found that statistical evidence concerning the effect of interest rate changes on Belgian net interest income is not clear-cut, possibly reflecting the fact that net interest income covers far more than just the income generated by the maturity transformation role of banks. The impact of current accounting practices that allow banks to smooth their income by shifting securities from the trading book to the banking book at their discretion might also be important. In this respect, one of the objectives of the proposed accounting regulation IAS 39 is to increase the transparency of banks' risk taking.

Besides mainly money market positions taken in the course of their trading activities, Belgian banks incur a significant exposure from their core function of attracting deposits to finance long term assets. To the extent that deposit balances are stable and have a behavioural duration that exceeds their contractual duration, interest rate risks associated with those exposures may still be limited. However, in today's low interest rate environment, deposits may at least partially comprise funds transferred from a less buoyant stock market. As interest rates increase, these funds may move to more productive investments either in or outside of the bank, leaving the bank vulnerable to higher financing costs or to losses from selling off long assets. In this respect, assumptions about the stable portion of deposits deserve careful review, so as not to understate the risk sensitivity of sight or savings deposits in specific interest rate scenarios.

In line with Basel I practices, Basel II will impose formal capital requirements to cover the interest rate risk in the trading book of the bank. However, no internationally-agreed formal capital requirements will be imposed with respect to the interest rate risk in the banking book, partly because the embedded options in deposit accounts are difficult to quantify. The national supervisor has a number of off-site tools in place that can serve as rough devices for detecting excessive interest rate risk exposure in the banking book of banks. More detailed on-site inspections can be triggered to refine the interest rate exposure assessment and to impose, if needed, extra capital requirements.

2.5 Impact of IAS 39 on asset and liability management and banks' capital ratios

The introduction of IAS 39 substantially modifies the accounting framework within which credit institutions have to work, creating more volatility in equity and net income. One of the essential concerns expressed by the banking sector is that banks want to be able to limit the volatility of the accounting net income by continuing to manage the interest rate risk on the basis of the economic risk rather than the accounting impact of changes in interest rates.

This article endeavours to show by means of an example that, under the new IAS accounting rules, a credit institution can manage the volatility of its net income without modifying its asset and liability management or position, notably by using the "fair value option". This option offers the banking sector a practical alternative to

hedge accounting, which cannot be applied because of the inability to meet the strict criteria imposed by IAS 39. Although there is justification for limiting the use of this fair value option, as the International Accounting Standards Board (IASB) proposes, particularly to prevent abuse and to preserve a degree of comparability in the annual accounts, it is essential to ensure that the limitations imposed are not so restrictive as to make it impossible to use this method.

If credit institutions do not have the necessary tools to manage the accounting volatility of their net income, they may in fact be tempted to modify their asset and liability position, or to manage this position without the use of derivatives, merely in order to stabilise the accounting net income. This could have implications for the economy, as the bank will accept more interest rate risk or, on the contrary, will reduce the duration of its assets by a cut in its long-term loans at fixed rates or its investment in long-term securities.

The article also points out that, in the IAS environment, accounting equity is more volatile. Credit institutions will probably want to limit that volatility. The behaviour of the credit institutions will depend both on the reaction of their counterparties and of the market in general in the face of this volatility, and on the way in which IAS 39 is treated in the context of the capital regulations. Care must therefore be taken to define rules on capital requirements which do not encourage credit institutions to take ALM positions solely in order to manage the accounting value of their equity and their capital ratio.

Financial Stability Overview

Introduction

As in the first two issues of the Financial Stability Review (FSR), the Overview article is devoted to an assessment of the financial stability conditions in the Belgian financial system. The structure of the Overview article has been slightly modified however as compared to earlier issues. Where the scope in Chapter 4 was limited last year to the bancassurance groups, the analysis has now been broadened to the insurance sector in general. A new Chapter 5 discusses recent developments in financial infrastructures, such as payment, clearing and settlement systems. The areas covered in the first three chapters have remained unchanged, being respectively devoted to recent developments in international financial markets, the financial position of the domestic private sector and the Belgian banking sector.

1. International financial markets

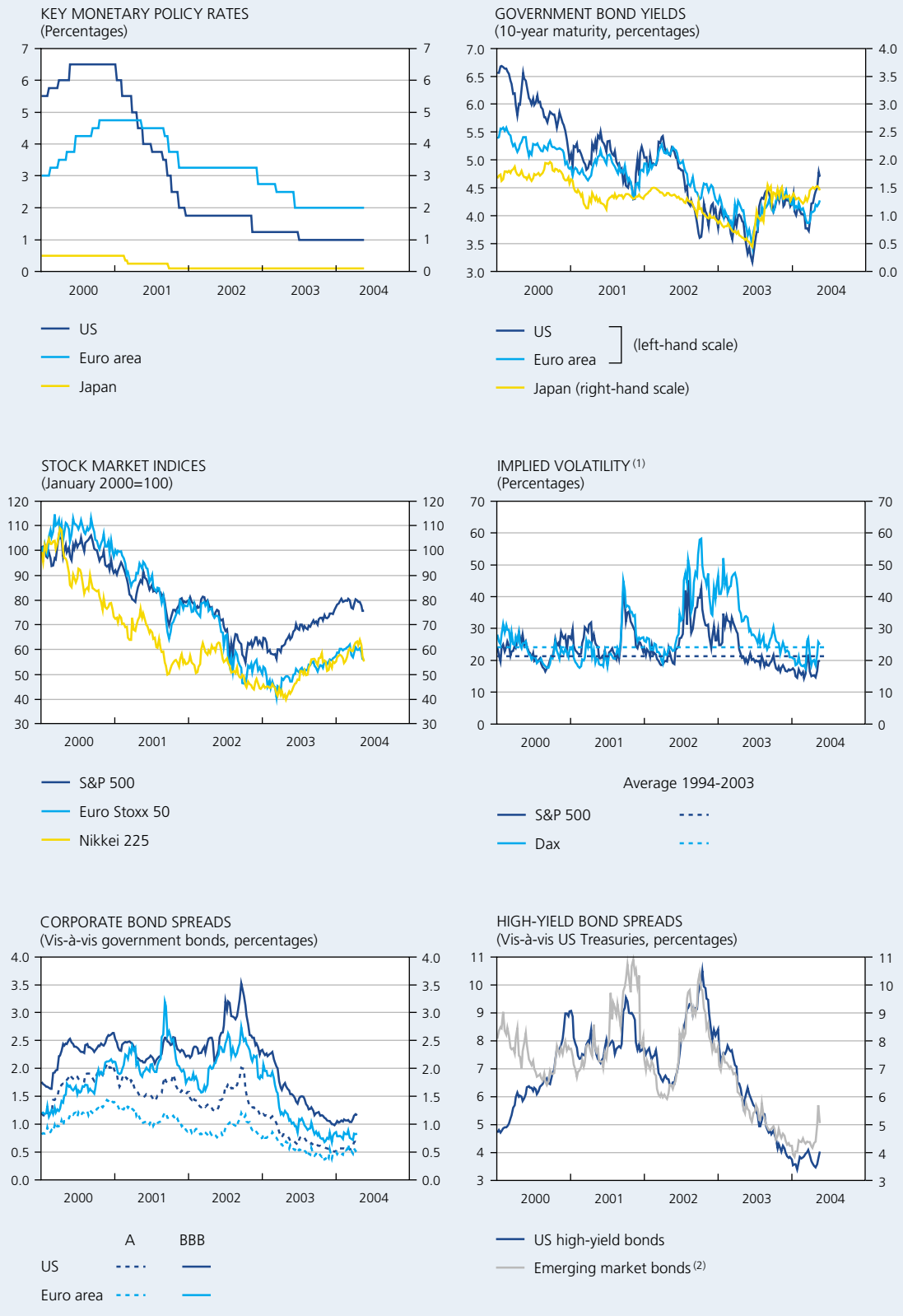
1.1 Developments in financial markets

Notwithstanding the turnaround in the global business cycle and the presence of large fiscal deficits in a number of countries, the period under review (June 2003-May 2004) was characterised by the persistence of low risk-free interest rates (Chart 1). By maintaining their key interest rates at respectively 1 p.c., 2 p.c. and 0 p.c., central banks in the US, the euro area and Japan anchored the yield curves in their respective currencies at historically low levels. In combination with the more positive outlook for the global economy, these low interest rates in turn set the stage for a strengthening of global equity prices and a narrowing of risk premia on corporate and emerging market bonds, even though recent changes in market expectations about the speed and magnitude of a return to a more neutral monetary policy stance triggered higher volatility in some segments of global financial markets.

While keeping a lid on the rates used for discounting future income streams, low interest rates also appear to have been instrumental in re-establishing investor confidence, which had been battered by the turbulent conditions in global financial markets in the period 2000-2002. Although the appetite for risk is hard to quantify precisely, an indicator developed by the Bank for International Settlements (BIS) suggests that investors' risk-appetite strengthened considerably in the course of 2003, before reversing some of its gains in 2004. [(1)] While this picture is consistent with developments in US and euro area equity market indices during that period – showing a progressive recovery in 2003, before trading sideways in 2004 –, it also fits in with the general trend in equity markets' implied volatility. From the heights reached in 2002 and the early months of 2003, these measures of investors' expectations of future stock market volatility in fact showed a marked decline in 2003, and remained at low levels in early 2004. As explained in Box 1, Merton-type credit risk models of corporate default link this (expected) volatility in equity market prices (as a proxy for the measure of a firm's assets' volatility) to expected default frequencies of firms, which declined substantially for US and European companies in 2003.

(1) See Packer and Wooldridge (2004), "*International banking and financial market developments*", BIS Quarterly Review, March 2004, pp. 1-11. See also Tarashev, Tsatsaronis and Karampatos (2003): "*Investors' attitude towards risk: what can we learn from options?*", BIS Quarterly Review, June 2003, pp. 57-65.

CHART 1 DEVELOPMENTS ON SOME KEY FINANCIAL MARKETS



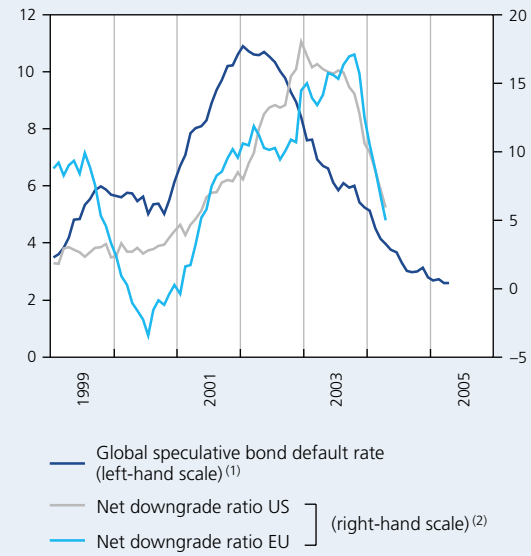
Sources : Bloomberg, Chicago Board Options Exchange, Deutsche Börse, JP Morgan, Merrill Lynch, Thomson Financial Datastream.
(1) Based on the volatility implied in S&P 500 and Dax options.
(2) EMBI + emerging market bond index.

By providing ample liquidity, monetary policies stimulated risk-appetite, thereby supporting the process of corporate balance sheet restructuring. Indeed, in the US, and to a lesser extent in Europe, non-financial corporations seem to have used the rebound in equity prices and the presence of historically low borrowing costs mainly as an opportunity to redress some of the remaining financial imbalances they had accumulated in the second half of the 1990s. Apart from focusing on restoring higher levels of internal funds, this process of balance sheet repair also involved continuously low investment in real and financial assets and a refinancing of outstanding debt, so as to lower borrowing costs and/or lengthen the average maturity of financial liabilities.

The decline of risk premia on the corporate bond markets to levels last seen in the months preceding the Russian and LTCM crises of 1998 thus went hand in hand with improvements in underlying corporate credit quality. As shown in Chart 2, these improved fundamentals also led to a further decline in the global speculative corporate bond default rate from the peaks reached in 2001-2002, dropping from 6.1 p.c. in June 2003 to 4 p.c. in April 2004. In 2003, there was moreover a significant turnaround in the net downgrade ratio of corporate bonds in the US and the EU, which fell from about 15 p.c. in June 2003 to below 6 p.c. in April 2004.

CHART 2 INDICATORS OF CORPORATE CREDIT QUALITY

(Percentages)



Sources : Moody's, Thomson Financial Datastream.

(1) The global speculative bond default rate is an issuer-weighted, 12 month trailing figure, measuring the number of corporate 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.

(2) The net downgrade ratio is defined as the difference between the number of downgrades and number of upgrades of corporate bond ratings, expressed as a percentage of the total number of rated issuers.

Box 1 – Intuition behind the Merton (1974) model

Structural credit risk models are based on a balance-sheet concept of solvency, stipulating that default occurs when the firm's asset value falls below a barrier. The Merton model, which is one of the first structural credit risk models, assumes that default occurs at the maturity of the debt when the firm's asset value is less than the face value of the debt.

In the case of default, debt holders only receive the firm's asset value, V_{assets}, and equity holders receive nothing. If no default occurs, debt holders receive the total debt value, V_{debt}, which is by assumption the face value of a zero-coupon bond. Thus, equity holders receive $V_{assets} - V_{debt}$ or zero and debt holders receive V_{debt} or V_{assets} (see Panel A of Table 1). The payoff of the equity holders is exactly the payoff of a call option on the value of the firm. By the same type of analogy, the value of the default-risky bond (or the debt value) is the same as having a long position in a risk-free bond and writing a put option on the value of the firm. Therefore, the Merton model and the structural credit risk models in general are also called option-based models, as they define the equity and debt value in terms of options on the firm's asset value.

In the structural credit risk models, default risk is explicitly linked to the firm's asset value (V_{assets}), the variability of the asset value (σ), the debt value, and the risk-free rate. An increase in the leverage ratio, which is the ratio of the firm's debt value to asset value, increases the probability of default. Hence, credit spreads will increase. An increase in the volatility of the asset value increases the probability that the asset value will suddenly jump below

the barrier (debt value), or that default occurs. Therefore, higher asset value volatility increases credit spreads. Within the setting of the Merton model, an increase in the risk-free rate reduces credit spreads. The expected growth of the firm's asset value equals the risk-free interest rate. An increase in the interest rate implies an increase in the expected growth rate of the firm value. This will in turn lower the probability of default and the credit spread. Note that, in the long run, the relation between the risk-free rate and the credit spread might be reversed (see Article "The determinants of credit spreads" in this FSR). Panel B of Table 1 gives an overview of the variables (derived from the Merton model) that affect credit spreads.

TABLE 1 MAIN FEATURES OF THE MERTON MODEL

Panel A: Characteristics of the Merton model

	No default	Default
Definition	$V_{assets} \geq V_{debt}$	$V_{assets} < V_{debt}$
Debt value	V_{debt}	V_{assets}
Equity value	$V_{assets} - V_{debt}$	0

Panel B: Determinants of credit spreads based on the Merton model

	Symbol	Relation with credit spreads
Asset value	V_{assets}	–
Volatility of asset value	σ	+
Debt value	V_{debt}	+
Risk-free rate	r	–

In practice, the asset value and its volatility are available only on an infrequent basis. Therefore, empirical studies often use the equity value and its volatility. For the volatility measures, the two basic approaches are either to compute the implied volatility for current option prices in the market or to compute the realised volatility over the recent past.

As the creditworthiness of several sovereign emerging market borrowers also improved – with upgrades over the past year for countries such as Brazil, Turkey, Russia and Indonesia –, improving credit fundamentals thus seem to have justified at least part of the substantial narrowing of spreads on corporate and emerging market bonds since the fall of 2002. However, the magnitude of the spread compression on high-yield bonds, and the recent correction in spreads on emerging market bonds suggest that, next to changes in underlying credit risk determinants, other factors were at play as well. Changes in credit fundamentals seem indeed to only partially explain the dynamics of spreads in corporate or emerging market bonds. (2)

In this regard, price movements may also have reflected to a certain extent an increase in speculative trading positions, such as carry trades, through which investors assume duration and/or credit risk while financing the investment with short-term loans in order to boost the total return of the transaction. As these carry trades were fostered by expectations that liquidity would remain ample for some period in the future, it is noteworthy that changing expectations about the future monetary policy stance in the US have recently put a damper on the buoyancy of financial markets, with spreads on emerging market bonds for example rebounding sharply.

(2) See in this connection for example the article "*The determinants of credit spreads*" in this FSR or Appendix I of Chapter II of the IMF Global Financial Stability Report (April 2004): "*Determinants of the Rally in Emerging Market Debt – Liquidity and Fundamentals*".

However, as the transition to higher interest rates should happen in the context of a further strengthening and broadening of the global economic recovery, gradual upward adjustments in interest rates do not necessarily have to be disruptive for global financial markets, on condition that the process is correctly anticipated by financial markets. While global financial markets do indeed appear to be priced for future increases in short-term interest rates, it is also comforting to note in this connection that they proved very resilient to instances of high volatility in global bond markets during the period under review, such as in the summer of 2003, when a perceived fading of the risk of deflation in the US triggered a sharp jump in long-term government bond yields.

The experience of 1994 shows nevertheless that, when markets are "priced for perfection" and a larger than expected change in short-term interest rates occurs – e.g. in the case of a negative supply-side shock or a disorderly correction of global current account imbalances –, the repercussions for global financial markets can be considerable. In this perspective, one of the main potential stress scenarios for the global financial system would consist in a significant upward adjustment in long-term interest rates – potentially amplified by the hedging of mortgage bond portfolios for changes in prepayment risk or an unwinding of leveraged trading positions –, as it would probably be associated with downward pressures on prices of other financial assets, such as equities and high-yield bonds.

1.2 Financial institutions

As can be gathered from the macro-prudential indicators in Table 1, US and euro area banking systems improved their performance in 2003, against the background of stronger economic growth and recovering financial markets. While the return on equity in the euro area went back to a level in line with the average recorded in the period 1996-2000, the profitability of US banks continued its remarkable ascent, on the back of a steady improvement in asset quality, a boom in mortgage banking and deposit gathering, and favourable trends in market-sensitive businesses.

With strong retail banking – fuelled partly by buoyant demand for housing loans – offsetting weak corporate banking activities, many banks in the euro area experienced an improvement in their interest and non-interest income in 2003. Together with continued efforts to cut costs, this recovery of banking income laid the basis for a significant reduction in the cost-income ratio.

TABLE 1 MACRO-PRUDENTIAL INDICATORS FOR THE US AND EURO AREA BANKING SECTORS
(Percentages)

	Average 1996-2000	2001	2002	2003
US				
Return on equity	13.8	13.0	14.1	15.0
Risk-asset ratio	12.6	12.9	13.0	13.0
Cost-income ratio	59.6	57.9	56.1	56.6
Provisions to total loans	0.60	0.97	1.04	0.70
Euro area (1)				
Return on equity	11.1	11.4	10.5	11.4
Risk-asset ratio	10.7	10.7	11.1	12.0
Cost-income ratio	68.5	68.7	69.2	66.2
Provisions to total loans	0.60	0.59	0.71	0.65

Sources: Bankscope, FDIC.
(1) The average for 1996-2000 is based on a sample of about 250 banks. The data for the other years are based on a sample of about 60 banks.

Although European banks avoided a large share of the credit losses generated by the collapse of the technology and telecom bubble, as companies in these sectors generally financed themselves through bonds and equity, high credit losses were one of the major reasons for the downturn in euro area banks' profitability in 2002. Firming economic activity and the absence of major corporate defaults (with the notable exception of Parmalat) allowed a reduction in these provisions for credit risk in 2003. In this regard, the growing share of mortgage loans in the total loan portfolio may also have contributed towards a reduction in the aggregate level of loan loss provisions, as the provisioning requirements for these loans are traditionally much lower than for corporate loans.

When firms will step up their investments in real and financial assets once again, and increase their demand for bank loans – in line with the acceleration of economic growth – it will be important for banks to adequately assess and price the new corporate credit risks they will assume in order to safeguard the asset quality of their corporate loan portfolio. Bad risks are in fact typically incurred in the upswing of the credit cycle, when optimistic expectations about the global economy or firm-specific prospects may lead to under-pricing of credit risk.

As commercial and/or residential real estate bubbles have in the past been the source of major banking sector problems, the very buoyant growth in housing prices and mortgage loans in a number of European countries also merits close monitoring. Mortgage lending-related risks may indeed become a more prominent concern, if housing markets were to cool down or a new slowdown in economic growth were to undermine the debt service capacity of highly indebted households. As concerns the latter, this might also be the case if higher short-term interest rates were to affect the creditworthiness of households with variable rate mortgages, a product which appears to have enjoyed strong demand recently in a number of euro area economies.

Next to credit risk, banks are also sensitive to changes in interest rates, due to the nature of their business. In this regard, while the major share of interest rate risk is taken in the banking book, market reports suggest that banks have also stepped up their risk-taking in their trading books, one reason being that declining volatility in a number of markets has allowed them to increase their volume of risk-taking for the same market risk capital requirement, as calculated according to VAR models. While this build-up of interest rate risk positions may expose the banks concerned to losses if unexpected interest rate shocks occur, euro area and US banks coped with the turbulence in global long-term interest rates in the summer of 2003 without major difficulties. Moreover, as neither banking system has experienced an erosion of capital adequacy levels in recent years, a sufficient buffer should be available to deal with unexpected developments.

Although higher interest rates are traditionally seen as more favourable to insurance companies than to banks – given the comparatively higher duration of the formers' liabilities, relative to that of their assets –, the capacity of the European insurance sector to cope with new shocks in global financial markets may have been reduced by the significant losses this sector sustained on its equity and corporate bond investments in the period 2000-2002, when some of its core businesses were also suffering from underlying profitability problems. The rebound in global equity prices has eased some of the most acute pressures in the insurance sector, however, and a number of companies have strengthened their capital base and have undertaken efforts to restore the technical underwriting results in life and non-life insurance activities. Yet, this adjustment process is somewhat less advanced in the life insurance sector, due to the inability to quickly adjust the financial terms of the policies, as these are generally of a long-term nature. Moreover, in a number of countries, the portfolio of life insurance policies consists of a large number of contracts with high guaranteed statutory or contractual minimum payouts (Germany, UK; see also Chapter 4 for Belgium). For these companies, a return to a higher level of long-term interest rates would be particularly welcome, although the transition towards such a higher level of interest rates may expose the insurance sector to an erosion of unrealised capital gains (or to losses) on their bond portfolios.

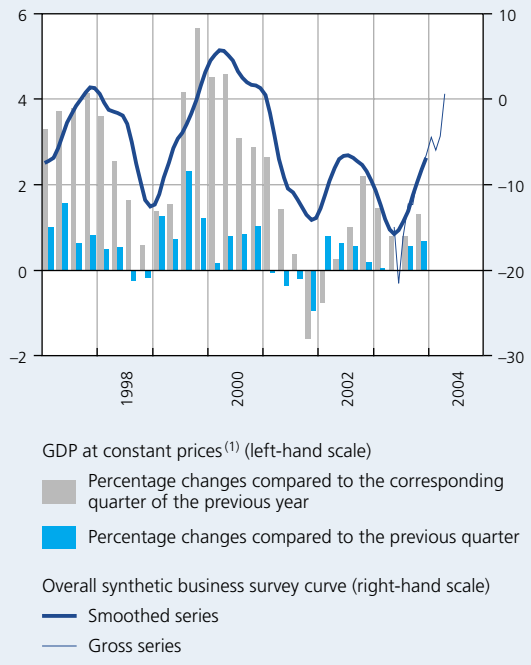
2. Financial position of the Belgian private sector

In parallel with the recovery of the business cycle in the euro area in the second half of 2003, economic activity in Belgium started to firm again towards the end of last year, bringing the rate of GDP growth for 2003 as a whole to a still modest 1.1 p.c. (Chart 3). The upward trend of the leading indicator suggests a continuation of this positive growth momentum in 2004. However, the fact that the Belgian economy is very open to international trade makes it quite dependent on developments in neighbouring countries. In this connection, a strengthening of the euro against the US dollar or a high oil price could affect the strength of the recovery in the euro area and Belgium.

2.1 Household sector

In a rather lacklustre macroeconomic context, Belgian households had to cope in 2003 with a new decline in the level of employment (–0.4 p.c.) and a further slowdown in the expansion of real disposable income (to 0.7 p.c.). Despite these negative developments, the balance sheet of Belgian households remained strong, as illustrated for example by the stabilisation of net wealth – defined as the difference between the value of financial and real estate assets on the one hand and financial liabilities on the other hand – at about 7 times households' annual disposable income in 2003 (Chart 4).

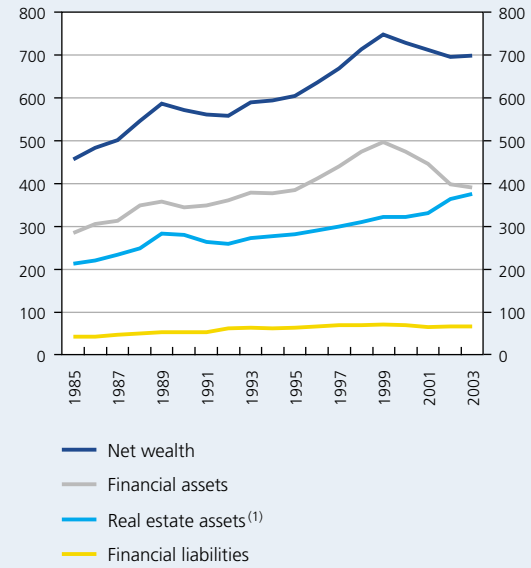
CHART 3 REAL GDP GROWTH AND BUSINESS SURVEY INDICATOR



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

CHART 4 DEVELOPMENTS IN BELGIAN HOUSEHOLDS' BALANCE SHEET

(Percentages of gross disposable income)

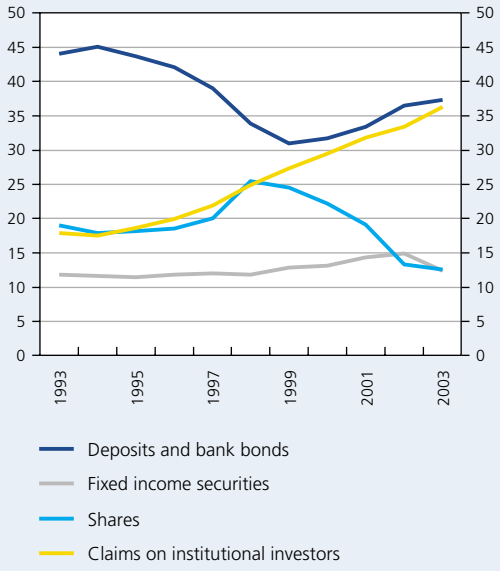


Sources : NSI, Rademaekers and Vuchelen (1998), Stadim, NBB.
(1) For the years up to 1997, the stock of households' real estate assets, at market values, was taken from Rademaekers and Vuchelen (1998) "Het Belgische gezinsvermogen 1992-97", Bulletin de documentation / Documentatieblad, Federal Public 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.

The stability in the value of households' financial assets in 2003, relative to 2002, in fact hides some major further changes in the composition of this asset class, reflecting both price and volume effects (Chart 5). With regard to the influence of changes in the prices of financial assets, the significant mark-downs in the market value of equity holdings undoubtedly contributed to the declining weight of equities in the investment portfolio, from about 25 p.c. at the end of 1999 to below 15 p.c. since 2002. Although these equity market declines may also have dampened the growth in the value of the outstanding claims on institutional investors – which include investments in life insurance products, mutual funds and pension funds –, the share of this component in total financial assets continued to grow in 2003 (to about 36 p.c.), thanks to continuously positive net inflows. The success of mutual funds with capital protection and life insurance products with

CHART 5 COMPOSITION OF HOUSEHOLDS' FINANCIAL ASSETS

(Percentages of total financial assets)



Source : NBB.

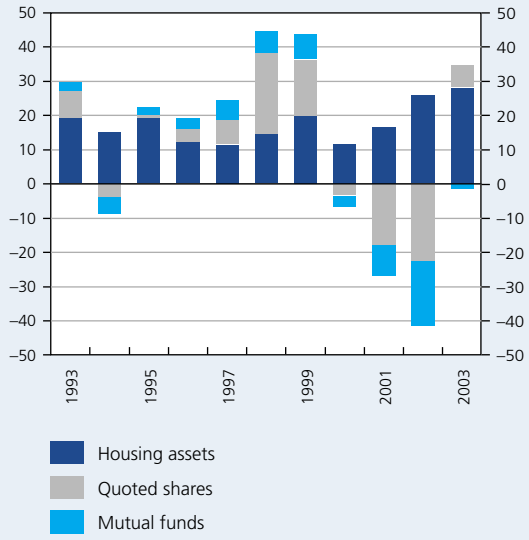
minimum guaranteed rates of return, to the detriment of more risky financial instruments, suggests however that households maintained a rather risk-averse attitude in their financial investments, in the wake of the unsettled conditions on the global capital markets in the period 2000-2002. This preference for low-risk assets, in combination with attractive yields offered by banks on (tax favourable) regulated savings accounts, may also have benefited the further growth in bank deposits. Yet, as it was partly offset by a continuation of the structural decline in the outstanding amount of bank bonds ("kasbons"/"bons de caisse"), it left the share of households' claims on banks in their total financial assets broadly unchanged at 37 p.c.

While the recovery of global equity markets in 2003 put to an end the period of significant capital losses on households' investments in quoted equities and mutual funds (Chart 6), the strong capital gains on housing and other real estate assets in recent years have lifted the relative share of this asset class in households' total assets towards 50 p.c. In the period 2002-2003 annual growth in the price of houses and building plots averaged respectively 7.8 p.c. and 13.9 p.c., with the sharp acceleration in the price of building plots being mainly the reflection of a growing scarcity of vacant land for new house building (Chart 7). The overall pace of housing price inflation since 1995 puts Belgium in a somewhat intermediate position between countries experiencing falls in housing prices (Japan and Germany) and countries experiencing very large gains in housing prices (including Ireland, the UK and Spain).

Although it is a common practice in some countries (such as the US, the UK or the Netherlands) for households to extract some of their home equity wealth through debt, the practice of home equity withdrawal has not (yet) become a feature of the Belgian real estate market. Mortgage refinancings do take place – witness the sharp increase in such operations in 2003 (see Chart 8) –, but these operations are mainly used by Belgian households to lower the interest burden of the loan (leaving the amount borrowed unchanged) or to shorten the duration of the loan (for the same monthly repayment burden).

CHART 6 CAPITAL GAINS AND LOSSES ON SELECTED FINANCIAL AND HOUSING ASSETS HELD BY HOUSEHOLDS (1)

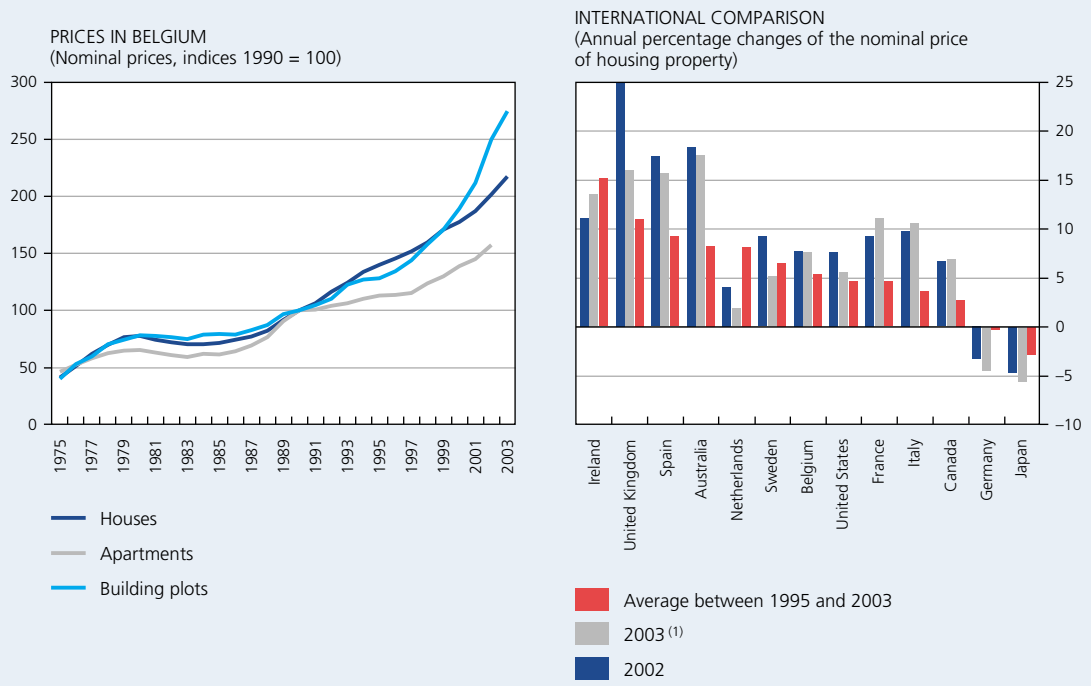
(Billions of euro)



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

(1) Capital gains and losses on financial assets are estimated by comparing flows and changes in stocks in the financial accounts data. As this source does not allow the calculation of capital gains and losses on households' direct holdings of bonds, this asset category was omitted from the chart. Capital gains and losses on housing assets are inferred from Rademaekers and Vuchelen (1998) and own calculations (see also note 1 in Chart 4 in this connection).

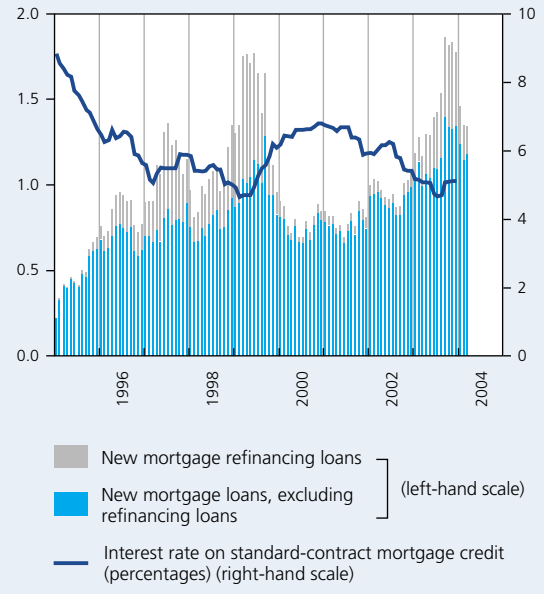
CHART 7 HOUSE PRICE INFLATION



Sources : Stadim, The Economist.
(1) Third quarter of 2003 or latest available.

CHART 8 NEW MORTGAGE LOAN PRODUCTION

(Billions of euro, unless otherwise stated)

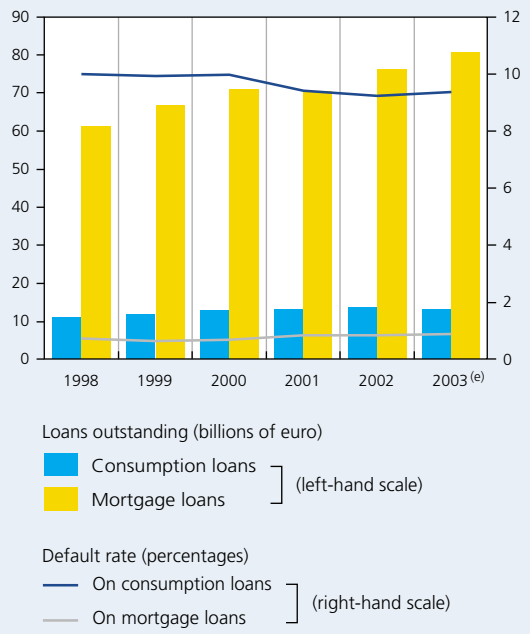


Source : NBB.

Low long-term interest rates not only led to a revival in the demand for mortgage refinancing, but also contributed to strong demand for new mortgage loans, causing the stock of outstanding mortgage loans to expand by nearly 10 p.c. in 2003. This acceleration in mortgage lending was not only due to an increase in the number of new loans, but also to a further rise in the average size of new mortgage loans, whose pace of increase continued to exceed the growth in households' nominal disposable income. In this connection, the analysis of recent developments in mortgage borrowing in Box 2 suggests that lower nominal interest rates and new mortgage loan products contributed to this observed rise in the debt/income ratio for first-time mortgage borrowers, while keeping a lid on the initial debt service burden of the loan relative to disposable income.

CHART 9 BREAKDOWN OF HOUSEHOLD DEBT AND ASSOCIATED DEFAULT RATES (1)

(End of period)



Sources : NSI, NBB.

(1) The default rates have been calculated by dividing the total amount of all payments due on loans in default (as registered in the credit register for loans to households) by the outstanding stocks of loans. As a general rule, a loan is considered to be in default if three contractual repayments have not been made or if one contractual repayment has not been made three months after its maturity.

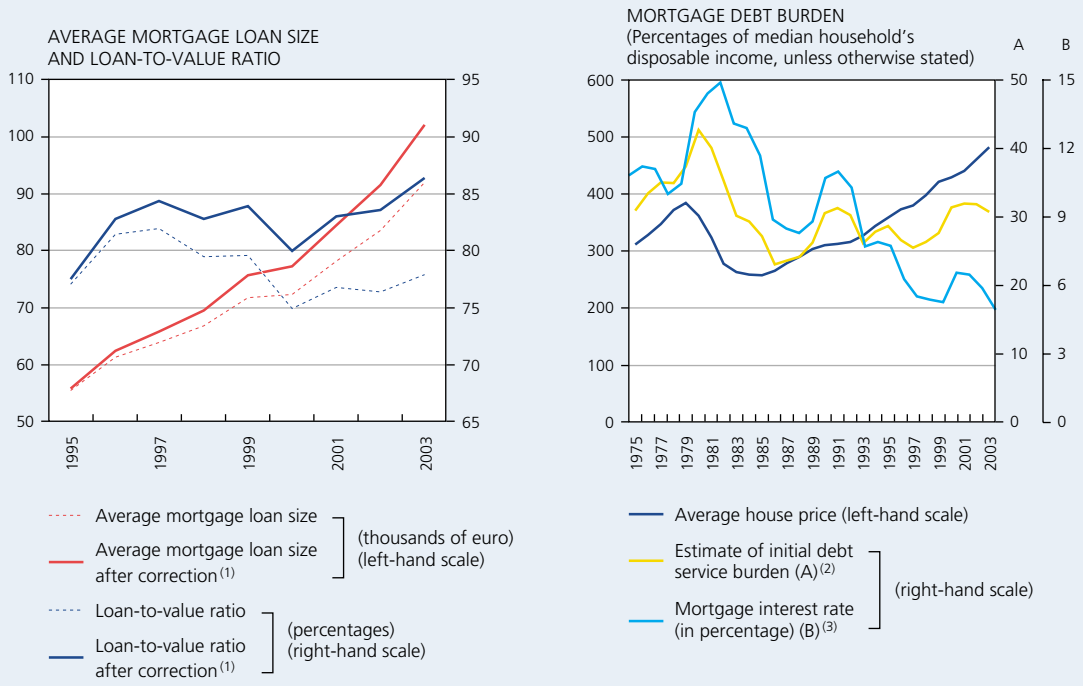
Although this may in turn have raised the incidence of unsustainable debt burdens at the micro level, the aggregate picture still shows a relatively moderate level of indebtedness for Belgian households, with household debt as a percentage of disposable income (66 p.c.) or as a share of total assets (8.5 p.c.) remaining quite low in comparison with the levels registered in a number of other countries. The default rate on mortgage loans has, as a consequence, remained very low, in contrast to the default rate on consumer loans, which has traditionally been significantly higher, but which, admittedly, concerns a much lower stock of debt (Chart 9).

Box 2 – Recent developments in mortgage borrowing

Since 1995, monthly data are available on the number and total volume of new mortgage loans taken out by Belgian households to finance the acquisition of an existing house. This information can be used to calculate the average amount borrowed by households to finance the acquisition of an existing house, with or without adjustment for the reportedly growing number of housing finance operations that involve – for tax and other reasons – the conclusion of more than one mortgage loan. The results are shown in the left-hand panel of Chart 1, highlighting a progressive increase in the estimated average amount borrowed by Belgian households from approximately 56,000 euro in 1995 to 102,000 euro in 2003, if one corrects the figures as described in note 1 of the Chart. In inflation-adjusted terms, the estimated increase in the average amount borrowed between 1995 and 2003 amounts to 6 p.c. per year. The chart also shows the associated estimates of the average loan-to-value (LTV) ratios, by dividing the estimated average amounts borrowed by households to finance the acquisition of an existing house by the average housing price recorded by the National Statistical Institute for the respective years. Using the corrected figures, these show an LTV-ratio of between 80 p.c. and 85 p.c. since 1996, with a rise to slightly above 85 p.c. in 2003.

While increases in the average size of mortgage loans may help explain why average house prices have risen comparatively faster than disposable income (right-hand panel of Chart 1), their impact on the mortgage loan related debt service burden for households can only be estimated on the basis of a rough calculation, as there are

CHART 1 INDICATORS FOR THE BELGIAN MORTGAGE MARKET



Sources: NSI, Stadim, NBB.

(1) As the purchase of one real estate asset is reportedly increasingly financed by multiple mortgage loans, the corrected figures are based on the assumption that, while purchases of real estate assets involved maximum one mortgage loan in 1995, 10 p.c. of new mortgage loan transactions in 2003 consisted of two mortgage loans (with linear intrapolation for the years in between).

(2) The features of the traditional standard mortgage loan in Belgium (20-year mortgage loan with fixed monthly instalments for the lifetime of the contract) were used to calculate a proxy of what has been, since 1975, the initial debt service burden of a household with a median disposable income that decided to borrow 80 p.c. of the average house price during that year, at the prevailing level of the 20-year nominal mortgage interest rate.

(3) Interest rate on a standard-contract mortgage loan, with a maturity of 20 years.

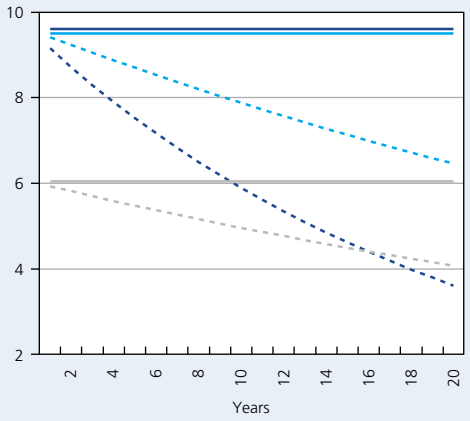
no statistics giving a reliable estimate of the debt service burden (including both interest and capital repayments) for Belgian households. The results of such a guesstimate – using the standard loan contract on the Belgian mortgage market and an LTV-ratio of 80 p.c. as a benchmark for the calculations – suggest that the initial debt service burden of a typical mortgage loan transaction in Belgium has been relatively stable at around 30 p.c. of a median household's disposable income since 1980.

This stability in the initial debt service burden at around 30 p.c. suggests in turn that Belgian households have leveraged not only the growth in their nominal disposable income (partly the result of an increase in the number of double-income families), but also the decline in nominal mortgage rates from about 10 p.c. in 1990 to 5 p.c. in 2003. This link between interest rates, sizes of mortgage loans and the associated level of debt service is further analysed in Chart 2.

In the left-hand panel of Chart 2, the nominal and inflation-adjusted cash flow patterns of a 20-year loan with a nominally fixed annuity for the lifetime of the contract are shown for three different cases. Case A depicts the nominal and real cash flows of a loan with a principal value of 75,000 euro, for a "steady state" in which nominal long-term interest rates and inflation amount respectively to 11 p.c. and 5 p.c. These roughly correspond to the average level of long-term interest rates and inflation in Belgium in the 1980s. Case B does the same for an identical loan of 75,000 euro, but for levels of nominal long-term interest rates (5 p.c.) and

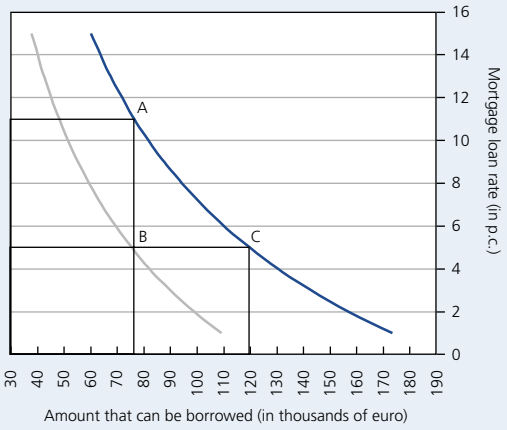
CHART 2 CONCEPTUAL PRESENTATION OF THE LINK BETWEEN INTEREST RATES, MORTGAGE LOAN SIZES AND DEBT SERVICE BURDENS (1)

DEBT SERVICE PROFILES OF A 20-YEAR, FIXED RATE MORTGAGE LOAN WITH FIXED ANNUITIES (in thousands of euro)



Nominal debt service
Real debt service

BORROWING CAPACITY, FOR A GIVEN INTEREST RATE AND ANNUITY



Indifference curve 1 (Annuity of 9,600 euro)
Indifference curve 2 (Annuity of 6,000 euro)

	Loan size (in euro)	Nominal interest rate (in p.c.)	Inflation (in p.c.)
Case A	75,000	11	5
Case B	75,000	5	2
Case C	120,000	5	2

Source : NBB.
(1) The features of the standard-contract mortgage loan, described in note 2 of Chart 1, were used as a basis for the calculations.

inflation (2 p.c.) that are more typical for the recent period. A comparison of these first two cases shows the following :

- the nominal annual instalments are higher in case A than in case B, with annual debt service levels respectively amounting to 9,600 euro and 6,000 euro ;
- the real cash flows are on average higher in case A (real interest rate of 6 p.c.) than in case B (real interest rate of 3 p.c.), resulting in a higher real burden of the loan ;
- the presence of higher inflation in case A (5 p.c.) leads to a more rapid erosion over time of the real burden of the loan than in case B (2 p.c.).

While the passage from case A to case B corresponds to a scenario in which households use the decline in nominal interest rates as an opportunity to lower the nominal debt service burden of their 75,000 euro mortgage loan, households facing a binding constraint on the amount they can devote to the servicing of a mortgage loan may prefer to use the decline in nominal interest rates as an opportunity to borrow more, while leaving the level of debt service constant. While in nominal terms, a move from case A to case C leaves the level of mortgage debt service constant at 9,600 euro, the real (i.e. inflation adjusted) burden of servicing is however significantly higher than the servicing of the 75,000 euro loan described in Case A, due to the fact that inflation is 2 p.c. instead of 5 p.c. In terms of the analysis developed in the right-hand panel of Chart 2 – showing two sets of combinations of nominal interest rates and average loan sizes that result in a same amount of debt service –, households facing a liquidity constraint on their

borrowing are thus more likely to move from point A to point C than from point A to point B in response to a decline in nominal mortgage loan rates. In the case of our numerical example, by moving from A to C, households fully leverage the drop in interest rates from 11 p.c. to 5 p.c. to raise the amount borrowed from 75,000 euro to 120,000 euro.

When considering the three cases described above, the actual mortgage borrowing behaviour of Belgian households – characterised by rising mortgage loan sizes and stable initial debt service levels, in a context of falling mortgage rates – appears to fit well case C, where household borrowing is constrained by a limit on nominal debt service levels (in the first year of the loan). While underscoring the importance of the decline in nominal mortgage rates in driving up the average size of new mortgage loans in Belgium, the existence of such a – self-imposed or not – "liquidity constraint" on mortgage borrowing also suggests that other factors may have played a role in this regard, such as the marketing of mortgage loans with longer maturities (25 or 30 years) or the growing success of mortgage loan contracts with variable rates, which – in times of a normal yield curve – carry lower interest rate costs than their fixed rate equivalents. The popularity of mortgage loans with variable rates has indeed increased markedly in recent years, thanks to the low level of short-term interest rates and the introduction of an "accordion clause" in a number of those contracts, whereby variations in the reference 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.

One should be careful, however, about using the main findings of the above conceptual discussion to draw inferences about the real mortgage debt service burden of Belgian households. First, the analysis disregards the role of growth in real disposable income. Second, while the presence of low inflation and a higher debt/income ratio would suggest that households currently face a higher real mortgage debt service burden than in the past, the "steady state" presentations used in the charts above are based on the assumption of a constant rate of inflation during 20 years, while the actual pattern of inflation over the past 20 years has, for example, been characterised by a process of disinflation. To the extent that this disinflation was not correctly anticipated by households, the ex post real mortgage debt service burden of a 20-year mortgage loan concluded in 1984, for example, may therefore have turned out to be higher than expected initially, unless these households used the possibility of mortgage refinancing – which typically carries a financial penalty of 3 months' interest in Belgium – to lower their debt service burden when nominal mortgage rates declined.

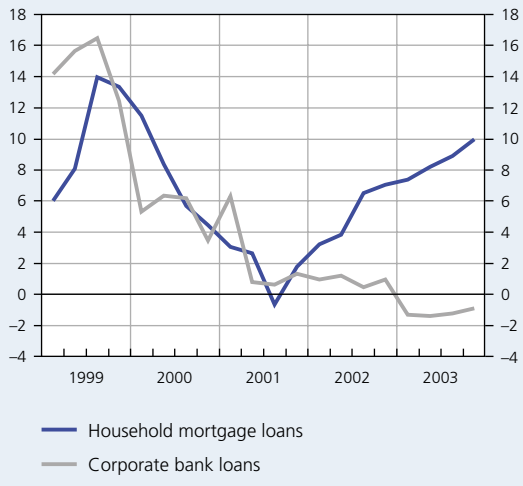
2.2 Corporate sector

Mirroring developments in the euro area and the US, there was a marked contrast in 2003 between the buoyant growth of households' mortgage borrowing and the moderate pace of corporate lending. As a matter of fact, the stock of corporate bank loans dropped by 1 p.c. in 2003, extending the negative trend that started in 1999, when corporate lending growth peaked at more than 15 p.c. (Chart 10). Such a sharp contrast in the dynamics of bank loans to households and corporates is rather unusual, albeit not unprecedented.

While subdued growth in corporate bank loans is hardly surprising in a context of weak economic activity, another factor that depressed the demand for corporate loans in Belgium (as in many other countries) was the decline in Belgian non-financial corporations' net external financing requirements (see Chart 11). This in turn resulted from the substantial fall in corporations' net investment in financial assets, which fell to 2.4 p.c. of GDP in 2003, after having peaked at 14 p.c. of GDP in 2000.

CHART 10 BANK LENDING TO BELGIAN HOUSEHOLDS AND CORPORATES

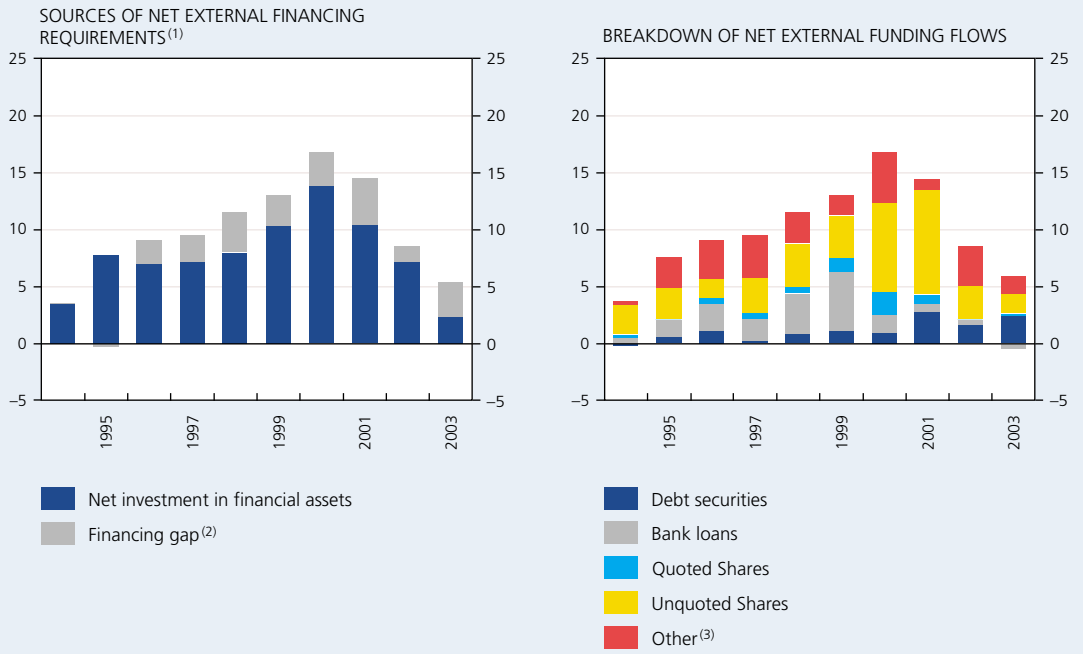
(Percentage changes in outstanding amounts compared to the corresponding quarter of the previous year)



Source : NBB.

CHART 11 NON-FINANCIAL CORPORATIONS' NET EXTERNAL FINANCING

(Percentages of GDP)



Sources : NAI, NBB.

(1) The net external financing requirement is the sum of the financing gap and non-financial corporations' net investment in financial assets.

(2) The financing gap is defined as the difference between non-financial corporations' capital spending and internal funding.

(3) This item covers, in particular, loans received from associated companies located abroad.

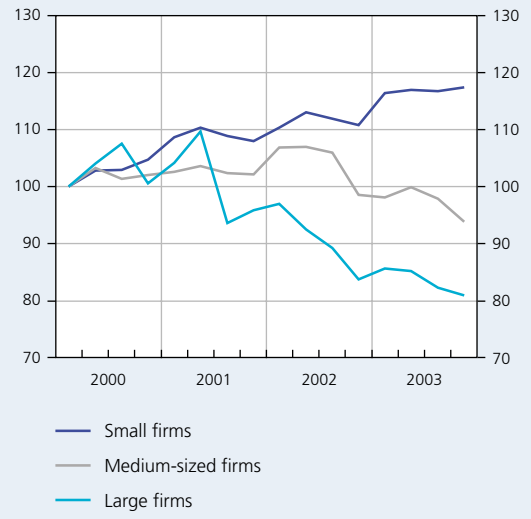
Although the financing gap, which measures the difference between corporations' capital spending and internal funding, increased as a result of a further slowdown in profitability, the total net external financing requirements of Belgian non-financial corporations declined from 17 p.c. of GDP in 2000 to 5 p.c. of GDP in 2003. Net issues of unquoted equity slowed to their lowest level since 1996, while issues of quoted equity showed no signs of revival. As concerns the latter, the large initial public offering of Belgacom in March 2004 did not involve a new issuance of own funds either, as it consisted in the sale of existing shares to the general public.

Following two consecutive years during which the net amount of new bank loans was lower than the net amount of funds raised through issues of debt securities, the outright substitution between the two sources of external finance in 2003 reinforced an existing trend that has lifted the share of debt securities in total financial debt to about 23 p.c. in 2003, up from 11 p.c. in 1994. As it is mainly large firms that have access to market financing as a potential substitute for bank loans, the revealed preference of corporations for non-intermediated debt financing may also help explain the contrasting trends in the data of the Central Credit Register, where bank loans outstanding to large and medium-sized firms dropped and the amount of credit taken up by small firms showed a slight increase (see Chart 12 and Chapter 3 where this topic is further discussed in the context of banks' credit risk).

As indicated in Chart 13, one of the reasons that may have fostered large corporations' shift towards financing through debt securities, to the detriment of bank loans, is the comparatively faster decline in corporate borrowing costs on the capital market, relative to bank loan rates. Indeed, as the yield on a 7-year BBB-rated corporate bond dropped to its lowest level in more than 4 years in the course of 2003, Belgian banks' headline rate for an investment credit remained at a higher level, and even showed a tendency to increase towards the end of the year.

CHART 12 LENDING BY BELGIAN BANKS TO RESIDENT NON-FINANCIAL CORPORATIONS (1)

(Indices, First Quarter 2000 = 100)



Sources : NBB.

(1) A company is considered as 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 both report in accordance with the full scheme, large firms having a turnover of more than 37.2 millions of euro over two consecutive years.

Progress with corporate balance sheet restructuring also translated into a further improvement in Belgian non-financial corporations' solvency ratios (see Chart 14). Although the results should be interpreted with caution – see Box 3 for a more detailed description –, results from two samples of firms for which the Central Balance Sheet Office had as of 7 May 2004 annual accounts data for the 2003 and 2002 book years in fact suggest that the median solvency indicator improved for both small firms and medium-sized and large corporations in 2003, extending the upward trend that started in 2000-2001. (3) The return on equity (ROE), in contrast, was still affected by the weak economic environment, and declined for the median large and medium-sized corporations and small firms from respectively 5.8 and 5.3 p.c. in 2002 to 5.6 and 4.8 p.c. in 2003.

Although these median estimates are judged to be a reliable indicator of underlying developments, they do not give any information about the distribution of the key financial soundness indicators within the population. However, as tests on the reliability of distribution measures using the constant samples proved inconclusive, the most recent reliable data available on the distribution of these indicators in the population of Belgian non-financial corporations pertains to 2002. Among other things, these show that 46.7 p.c. of the 227,332 companies reporting their annual accounts according to the abbreviated reporting scheme did not register a positive ROE in 2002, with the corresponding share for the 15,980 companies reporting their annual accounts according to the full reporting scheme being 37.4 p.c. In addition, the share of companies with a level of debt exceeding at least four times their level of equity (i.e. a solvency indicator of less than 20 p.c.) amounts to approximately 39 p.c. for both small and large non-financial corporations, with the percentage of firms combining this with a non-positive ROE being respectively 26 p.c. and 21 p.c. While suggesting an abnormally high number of financially weak firms in the population of non-financial corporations, these figures should be put in perspective, as the population also includes a significant number of dormant or marginal companies. As shown in the frequency distribution of the solvency indicator, the proportion of companies with a negative solvency ratio is indeed quite high (14.5 p.c.).

(3) Although the solvency indicator for the median medium-sized and large company remained below that for the median small company, this difference in the level should be interpreted with caution, as the average solvency indicator has traditionally shown the mirror image, with large companies being better capitalised than small ones. While one might prefer, at first sight, to use average, instead of median, indicators, the former have proven to be very sensitive to developments in a few large companies. Moreover, the backtests that were performed for the use of a sample of early reporters to infer developments for the whole population of non-financial corporations in 2003 were inconclusive for the "average" measures (see also Box 3 in this regard).

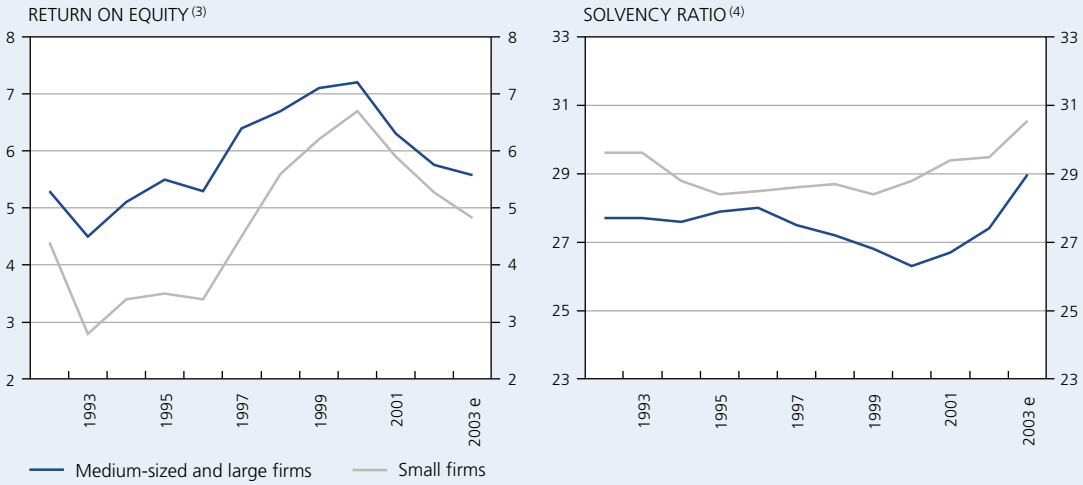
CHART 13 INTEREST RATES ON CORPORATE BANK LOANS IN BELGIUM AND ON EURO-DENOMINATED CORPORATE BONDS

(Percentages)

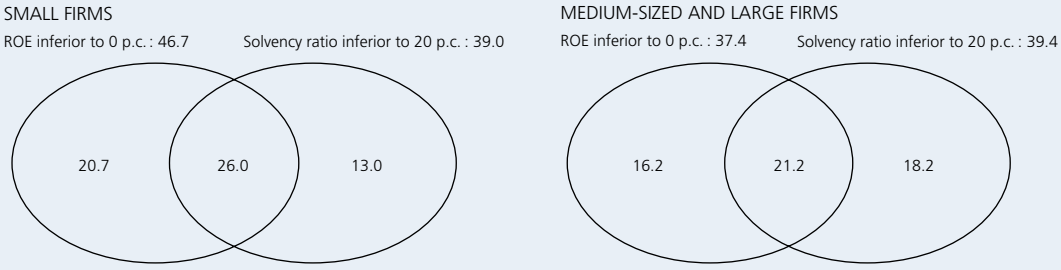
Sources : Bloomberg, Merrill Lynch, NBB.

CHART 14 KEY INDICATORS FOR BELGIAN NON-FINANCIAL CORPORATIONS (1)

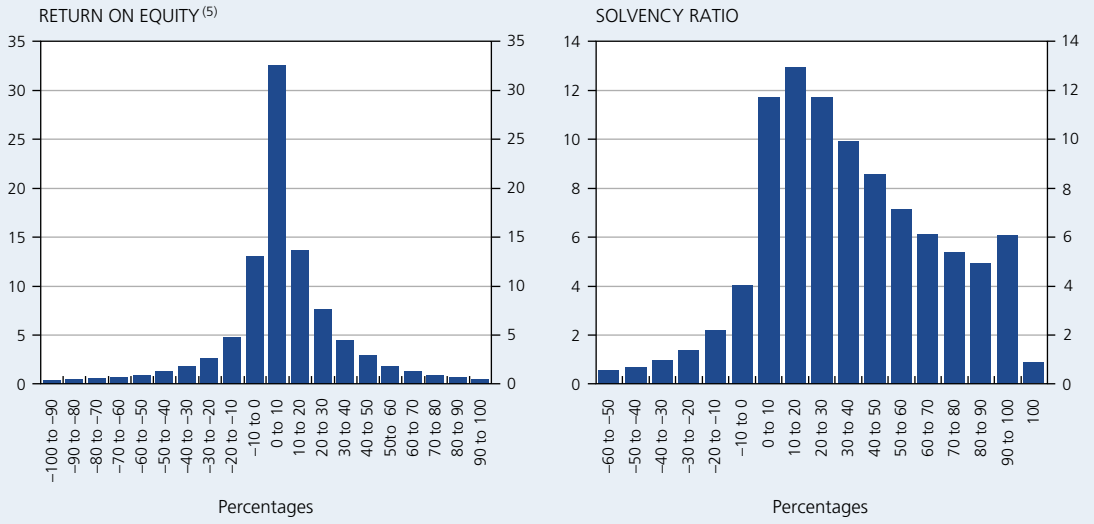
MEDIAN PROFITABILITY AND SOLVENCY INDICATORS (2)
(Percentages)



COINCIDENCE OF FINANCIAL HEALTH INDICATORS (YEAR 2002)
(Percentages)



FREQUENCY DISTRIBUTION (YEAR 2002)
(Percentages of total number of firms)



Source : NBB.

(1) A company is considered as 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 2003 are calculated by applying to the 2002 medians the percentage of variation observed in the constant sample.

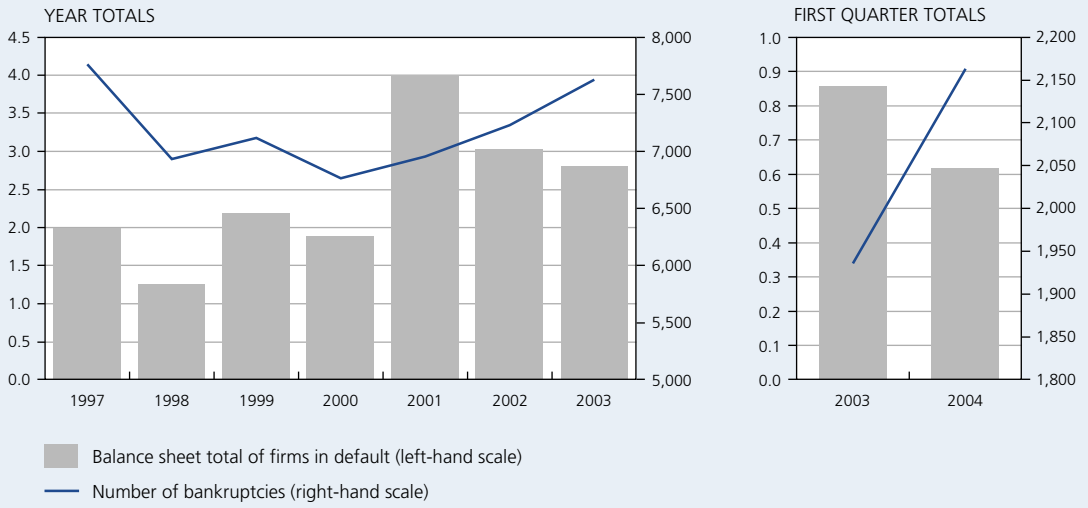
(3) The return on equity is calculated as net after tax results over capital and reserves.

(4) The solvency ratio is calculated as own funds divided by balance sheet total.

(5) The firms with negative own funds or a financial year different from 12 months are excluded from the distribution.

CHART 15 BANKRUPTCY INDICATORS

(Billions of euro, unless otherwise stated)



Sources : Graydon, NBB.

Yet, even if one filters out these "a-typical" firms from the sample of non-financial corporations – as is done in the frequency distribution of the ROE –, the percentage of companies having a negative ROE is still 30 p.c. It is therefore hardly surprising that weak economic growth in 2003 was associated with a further increase in the number of bankruptcies, to the highest level since 1997. The amount of total assets that was involved in bankruptcy proceedings fell, however, as the number of large bankruptcies remained limited (Chart 15). These diverging trends in the number and asset total of corporate bankruptcies continued in the first quarter of 2004.

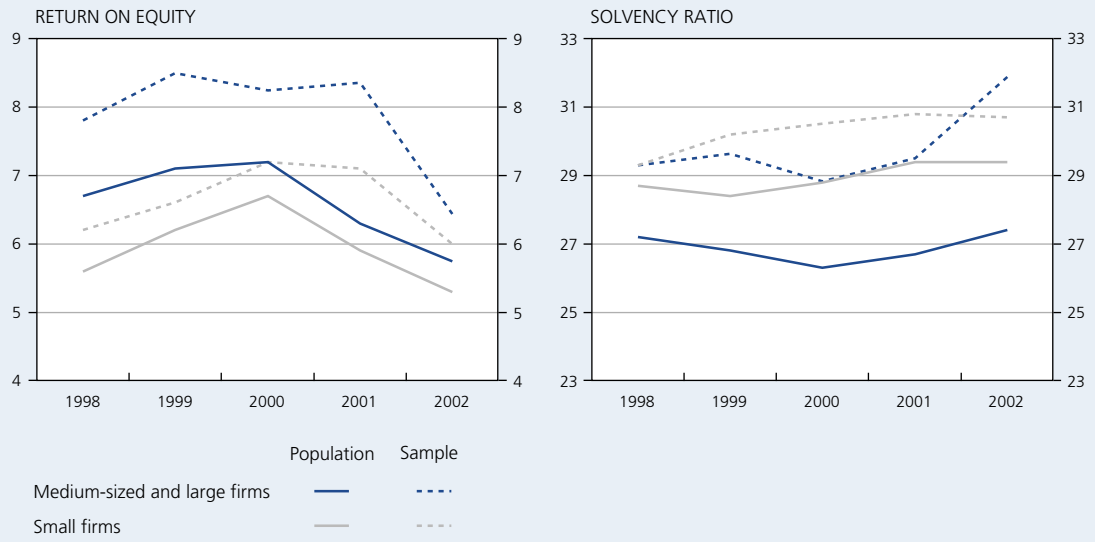
Box 3 – Assessing corporate performance in 2003 on the basis of early reporters to the Central Balance Sheet Office

The Central Balance Sheet Office (CBSO), which is the main source of information concerning the financial position of non-financial corporations, gives a global picture of the economic health of small and large firms. However, at the time of writing this FSR, the latest available data for the whole population of non-financial corporations covered the year 2002. As a result, there is a significant time lag in the data used to assess the global financial resilience of this sector.

As in May 2004, the CBSO already disposed of the 2003 annual accounts of more than 40,000 companies, it was decided, in co-operation with the CBSO, to evaluate to what extent these early reporters can be used to assess corporate performance in the preceding year. To this end, two constant samples were created of firms having reported their 2003 accounts in May 2004 and for which 2002 accounts were also available. The first constant sample concerned medium-sized and large firms, submitting their annual accounts according to the full reporting scheme (2,363 firms). The second constant sample contained the small firms, i.e. those reporting in accordance with the abbreviated reporting scheme (38,699 firms).

CHART 1 COMPARISON OF MEDIAN RETURN ON EQUITY AND SOLVENCY RATIOS IN THE POPULATION AND THE SAMPLES OF EARLY REPORTERS

(Percentages)



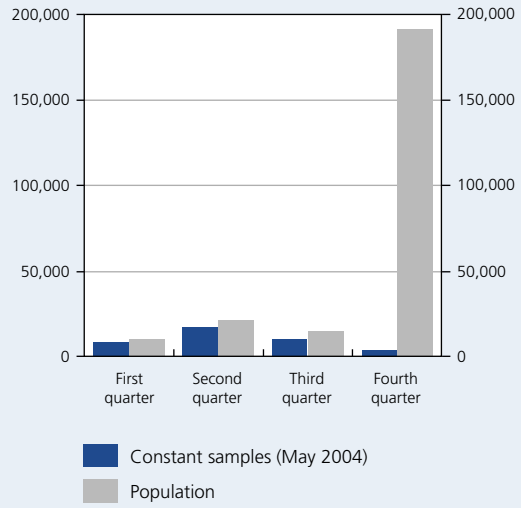
Source : NBB.

To evaluate the reliability of such constant samples in providing estimates of the return on equity and the solvency ratio in the whole populations of, respectively, the medium-sized and large firms and the small firms, backtests were done for similar constant samples for the period 1998-2002, by comparing different moments for the constant samples with those of the population. While the calculated moments were the median, the quartiles, the average, the standard deviation, the skewness and the kurtosis, the backtests showed that only the median indicator gives a good estimate in terms of direction and variation percentage of corresponding developments in the population (see Chart 1 for a comparison of the median return on equity and solvency ratios, for the samples and the populations). Yet, the median indicator of the sample tends to be systematically higher than the corresponding figure for the population, which might be explained by the fact that, *ceteris paribus*, healthier firms tend to report earlier, creating an upward bias in the constant samples.

However, in this connection, it must also be noted that the majority of firms which had already reported their accounts in May have a book year that does not correspond to a full calendar year. In the case of the samples of early reporters available in May 2004, the majority of firms had closed their 2002 book year before December 2002 (see Chart 2, which compares, for the last year for which full data are available, the distribution of firms according to the closing date of their annual accounts in the constant samples and in the whole population). This confirms that the financial ratios of firms in the samples are probably more the reflection of the business conditions prevailing at the juncture of the two preceding years.

CHART 2 DISTRIBUTION OF FIRMS ACCORDING TO THE CLOSING DATE OF THEIR 2002 ACCOUNTS

(Number of firms)



Source : NBB.

3. Banking sector

Notwithstanding the recent development of securities markets in euro, banks remain by far the most important provider of external funds to firms in continental Europe. In Belgium, more specifically, bank loans to domestic non-financial corporations still far exceed the outstanding volume of corporate bonds and are comparable to the capitalisation of the equity market (Table 2). This financial structure is in sharp contrast with the situation prevailing in the US or the UK, where the stock market capitalisation is a multiple of the volume of bank lending and where firms rely to a much higher degree on the bond market than in continental Europe.

At the same time, Belgian credit institutions remain a major player in the collection of savings, as bank deposits from the domestic non-financial private sector represented, at the end of 2003, 81.2 p.c. of GDP compared to 69.4 p.c. in the euro area and 56 p.c. in the US.

TABLE 2 INTERNATIONAL COMPARISON OF FINANCIAL STRUCTURES (1)

(Percentages of GDP, data on a territorial basis)

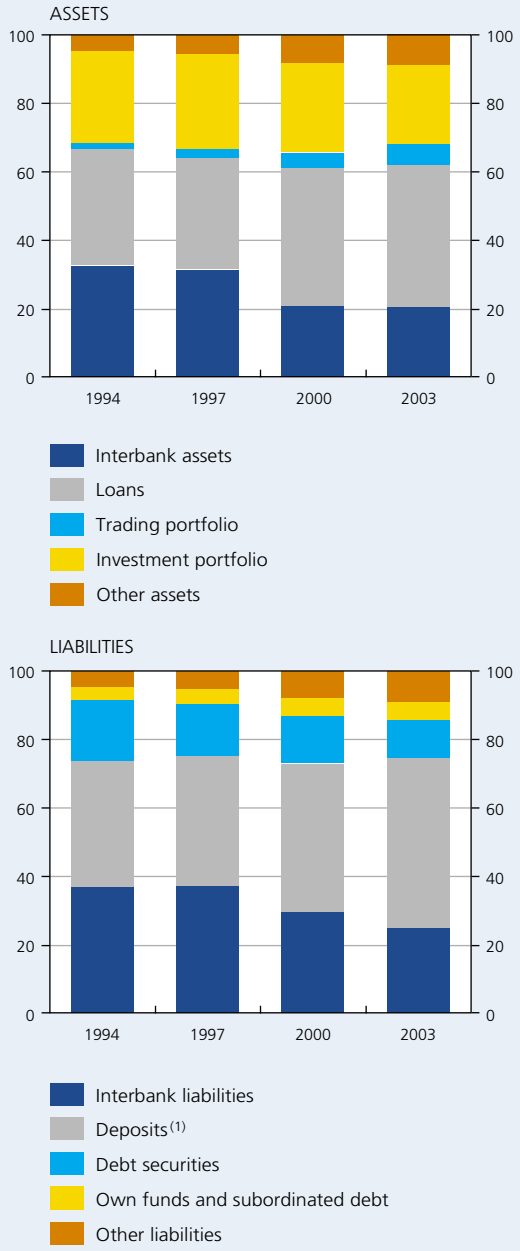
	US	UK	Euro area	Belgium
Bank loans to domestic non-financial corporations	10.7	30.0	41.8	38.2
Debt securities issued by domestic non-financial corporations	28.4	n.a.	8.1	13.8
Stock market capitalisation	141.0	122.2	50.3	46.8
Bank deposits from the domestic non-financial private sector	56.0	66.6	69.4	81.2

Sources : Bank of England, ECB, IMF, US Federal Reserve System, NBB.

(1) Data at the end of December 2003, with the exception of debt securities issued by euro area non-financial corporations (September 2003).

CHART 16 BALANCE SHEET STRUCTURE OF THE BELGIAN BANKING SECTOR

(End of year consolidated figures, percentages of total)



Sources : BFIC, NBB.

(1) Sight, savings and term deposits, as well as other non-securitised debts towards clients.

Besides their role on the local market, the major Belgian credit institutions have also developed their activities abroad. This has led to a strong increase in banks' balance sheets whose total, on a consolidated basis, has climbed from 634 billions of euro at the end of 1994 to more than 1,000 billions of euro at the beginning of 2000. Since then, however, this amount has tended to level off and had hardly changed at the end of 2003 (1,033 billions of euro).

This stabilisation is due partly to a slowdown in foreign expansion and a few changes in the scope of consolidation of some large multinational banking groups. It probably also illustrates banks' efforts to limit the size of their balance sheet in order to economise on the use of their capital. This more active balance sheet management has been pursued through new techniques, such as securitisation of assets, and has also been translated into a reduction of the gross positions on the interbank market. While those positions represented 32.7 p.c. of assets and 36.9 p.c. of liabilities at the end of 1994, those two percentages had decreased to, respectively 20 p.c. and 24.9 p.c. at the end of 2003 (Chart 16). This downsizing of interbank positions has been partly compensated by an increase in off-balance-sheet operations, with the notional amounts of interest rate derivatives now representing more than three times the total assets of the sector.

The major counterpart of the relative reduction in interbank assets has been an increase in loans which now represent over 40 p.c. of total assets while 10 years ago they accounted for some 30 p.c. Although the relative importance of securities' holdings has remained rather stable, there has been a shift from the investment to the trading portfolio as banks endeavour to perform a more active management of this component of their assets.

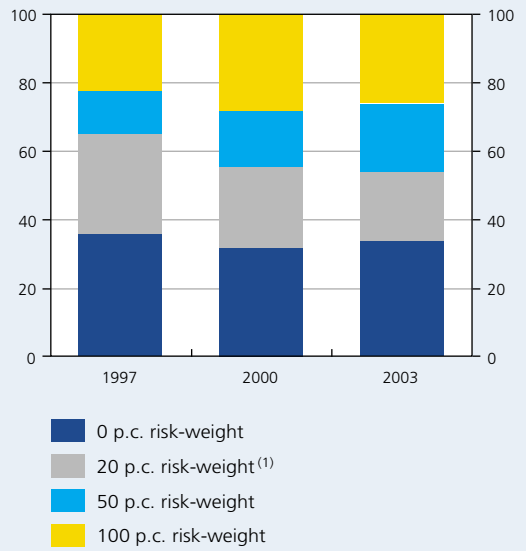
On the liability side, the lower share of interbank borrowing has been compensated by higher deposits by customers. At the end of 2003, deposits represented almost 50 p.c. of the balance sheet total, up from 37 p.c. at the end of 1994. However, this increase is partly in compensation for the gradual reduction in bank bonds ("kasbons"/"bons de caisse") issued by Belgian credit institutions.

3.1 Credit risks

The changes in the structure of banks' assets have an impact on the nature of the credit risks endorsed by those institutions. The provision of credit remains the major source of risks for banks, and most of the capital requirements imposed by Basel I are linked to that specific activity (more than 90 p.c. of total requirements). Within this envelope, there has been a gradual shift from lower risk-weight classes to higher ones (Chart 17). At the end of 2003, almost half of total credit risk bearing assets had a risk-weight of 50 p.c. (mainly mortgage loans) or

CHART 17 WEIGHTING OF ASSETS FOR CREDIT RISK REQUIREMENTS

(End of year consolidated figures, percentages of total credit risk bearing assets)



Sources : BFIC, NBB.

(1) Also including the non-substantial portion of assets which have a 4 p.c. or 10 p.c. risk-weight.

100 p.c. (mainly other claims to the private sector), while they represented only a third of total assets at the end of 1997. This has been compensated by a strong decrease in the relative share of assets with a 20 p.c. risk-weight, which mainly include interbank positions. Finally, the still high proportion of Belgian and other euro area government bonds in banks' balance sheets explains why more than 30 p.c. of total assets do not carry any capital requirement (0 p.c. risk-weight).

This distinction between a few risk-weight categories remains very crude and the treatment of credit risks will be much refined in the new Basel II capital accord, in which more sophisticated credit risk management techniques will form the basis for allocating capital requirements to the various categories of assets.

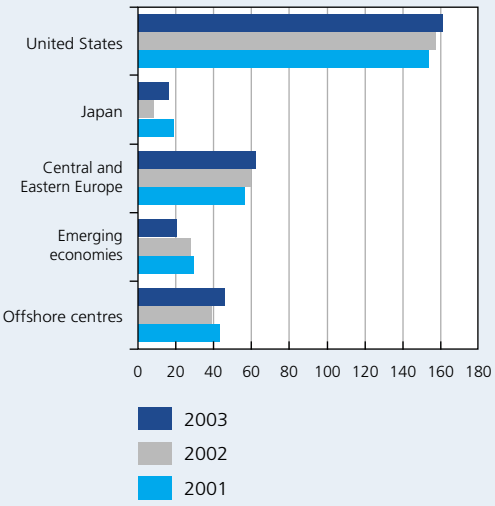
Although most of Belgian banks' credit risk bearing assets are located in western European countries, the exposure to other parts of the world represents more than three times the sector's total regulatory own funds (Chart 18). The lion's share is taken by the US. The exposure to that country increased further in 2003 notwithstanding the depreciation of the US dollar ; the majority of those claims are on the non-bank private sector.

The major changes in Belgian banks' international exposures in 2003 have concerned Japan and the emerging economies. In Japan, Belgian banks, which had sharply reduced their exposure in 2002, have been rebuilding their positions in the context of a gradual improvement of the economic situation in this country. In emerging markets, the Belgian credit institutions have reduced their claims on Latin America in the aftermath of the financial crisis in Argentina and Brazil, while slightly increasing their exposure to Asia.

While the two above-mentioned developments are related to cyclical factors, the further increase in positions in Central and Eastern Europe is of a more structural nature. In recent years, a large Belgian bank, KBC, has progressively acquired a strong position in some of the countries which have recently joined the EU. This second market has been built in stages (Chart 19). In 1999 and 2000, KBC acquired the Czech bank CSOB through a privatisation process. At the same time, an exposure to the Slovak market was built up through a subsidiary of CSOB. The entry into the Hungarian and Polish banking markets was mainly achieved during 2000 and 2001. In 2003, however, the exposure to the Polish market decreased, following substantial write-offs on the loan book and a depreciation of the Polish Zloty.

CHART 18 BELGIAN BANKS' FOREIGN EXPOSURES (1) (2)

(End of year consolidated figures, expressed as percentages of regulatory own funds (3))



Source : NBB.

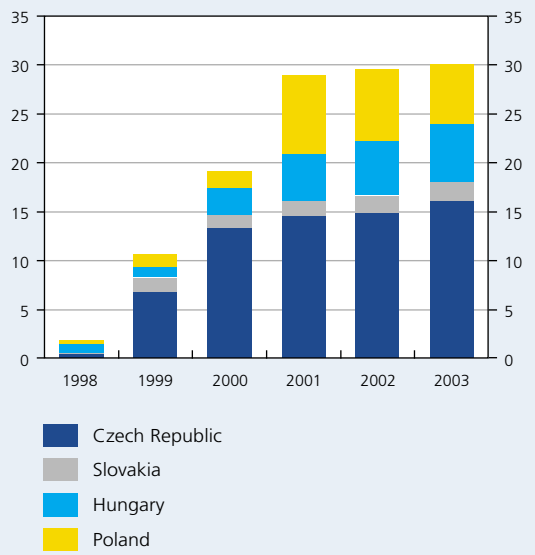
(1) Excluding western European countries.

(2) Total of loans and securities holdings after risk transfers via guarantees.

(3) Regulatory own funds as defined for the calculation of the risk asset ratio.

CHART 19 BELGIAN BANKS' EXPOSURE TO CENTRAL AND EASTERN EUROPE

(End of year consolidated figures, billions of euro)



Source : NBB.

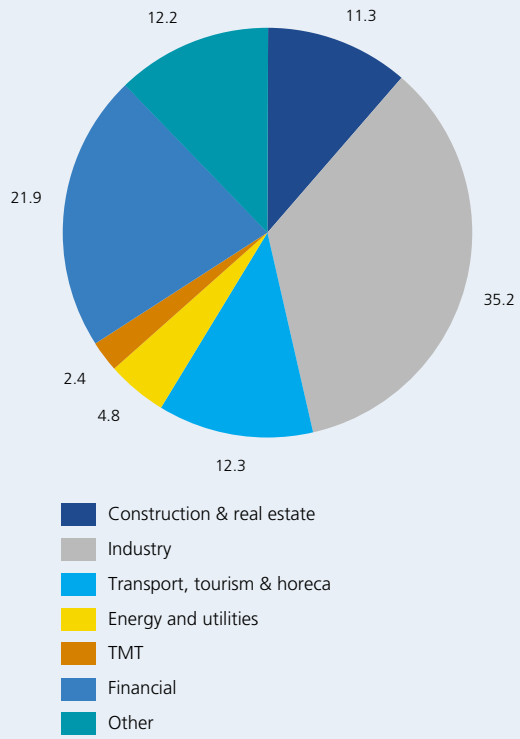
Notwithstanding the persistence of asset quality problems in Poland, the macro-prudential indicators for the Czech, Hungarian, Slovak and Polish banking systems continue to show generally sound and stable financial conditions. Political uncertainties, high fiscal and external deficits and changing market expectations about the future path of macroeconomic convergence have nevertheless been the source of pressures on exchange and interest rates in Hungary and Poland. Moreover, although the process of financial deepening is welcome, double digit credit growth in the Czech Republic, Hungary and Slovakia has raised some financial stability concerns. This strong expansion of banks' loans to the domestic private sector occurs in the presence of continued weaknesses in crucial support structures, such as effective bankruptcy and collateral procedures. In some countries, it also reflects a strong demand for foreign exchange denominated housing loans, which carry low interest rates but expose the households concerned to the risk of a sharp increase in the burden of the loan in the event of a depreciation of the domestic currency.

Given the substantial involvement of foreign strategic investors, the surveillance of the financial systems of the New Member States has to rely on a strong co-operation between host and home supervisors, as the latter are responsible for the supervision on a consolidated basis of the banking groups active in these markets. In the case of the BFIC, which is responsible for the consolidated supervision of KBC, the modalities of co-operation with the Hungarian, Czech and Slovenian supervisors have been laid down in memoranda of understanding. A similar agreement has not yet been formalised with the Polish supervisory authorities.

Besides diversifying geographically, banks are also spreading their risks through sectoral diversification of their loan exposure (Chart 20). At the end of 2003, 35.2 p.c. of credit lines were granted to industrial firms. While this share is higher than the contribution of this sector to Belgian and EU GDP, it is representative of the higher external financing needs for this category of activities.

CHART 20 BELGIAN BANKS' SECTORAL LOAN EXPOSURES (1)

(Unconsolidated figures end 2003, percentages of total loan exposure)

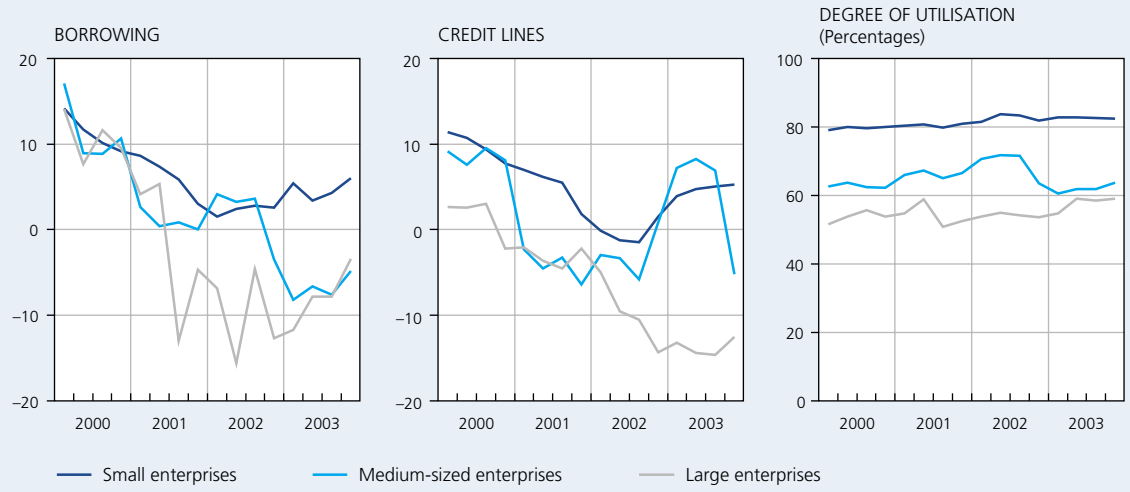


Source : NBB.

(1) Total of credit lines opened by Belgian credit institutions to resident and non-resident corporations.

CHART 21 BELGIAN BANKS' LENDING TO RESIDENT NON-FINANCIAL CORPORATIONS [1]

(Unconsolidated figures; year on year percentage changes unless otherwise stated)



Source : NBB (Credit register, Central Balance Sheet Office).

(1) A company is considered as 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 both report according to the full scheme, large firms having a turnover of more than 37.2 millions of euro over two consecutive years.

Belgian banks' exposure to sectors traditionally considered as more vulnerable or, at least, more volatile, remains limited. TMT firms only represent 2.4 p.c. of the total credit lines opened to corporations. While the position in the construction and real estate sector is higher, at 11.3 p.c., this percentage is still much lower than that observed in several other EU countries. The percentage for financial firms (21.9 p.c.) appears quite high. It is, however, somewhat misleading as it includes corporations, such as holding companies, which have important, but largely unused, credit lines.

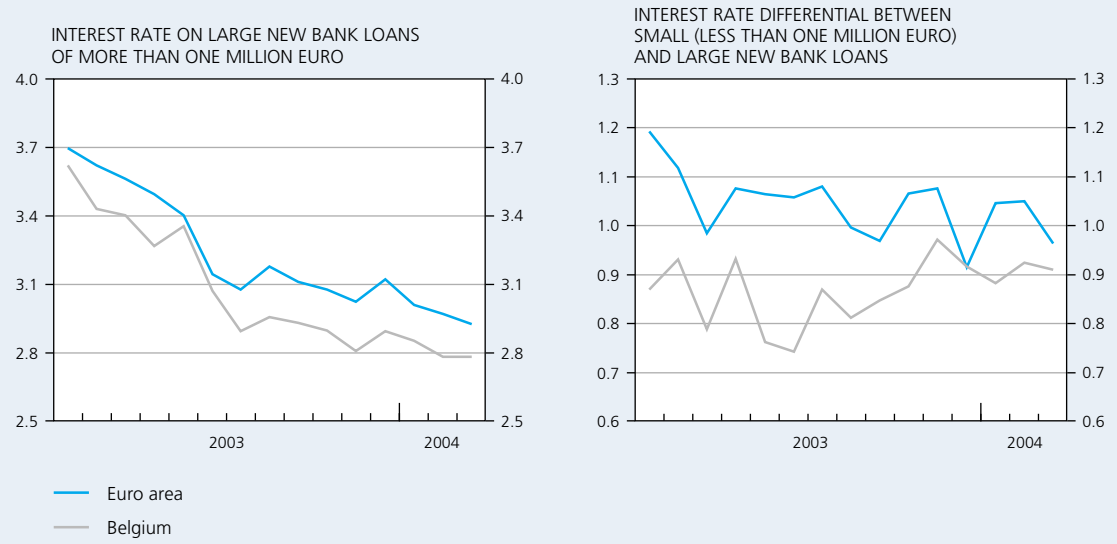
Indeed, the extent to which opened credit lines are actually used by their beneficiaries can vary greatly from one borrower to the other. One of the determining factors in this respect seems to be the size of the corporation. On average, the degree of utilisation of credit lines appears much higher for smaller firms (Chart 21). SMEs do not only rely more intensively on their bank credit relationship, they also have fewer such connections as the typical Belgian SME borrows from only one bank. This characteristic, which is analysed in an article of this FSR devoted to "Belgian SMEs and bank lending relationships", is probably linked to the relative information opaqueness of small firms, which induces banks to establish close relationships with those customers in order to reduce problems of information asymmetries.

In recent years, another difference has been observed between large and small firms, concerning the volume of the demand for credit. As already commented in Chapter 2, larger firms have recently shifted towards debt securities markets with the consequence that both credit lines and the outstanding amount of borrowing from banks have decreased for this category of banks' customers, in contrast with the increase still recorded for smaller firms.

Banks' credit policy does not only pertain to the volume of credit lines but also the pricing structure. Since the beginning of 2003, harmonised country-by-country price statistics on bank loans are collected within the euro area. These "Monetary financial institutions Interest Rate Statistics" (the so-called MIR-Statistics) – collected through surveys by the different NCB's and aggregated by the ECB – allow a comprehensive international comparison of bank loan rates within euro area countries (Chart 22).

CHART 22 BANKS' INTEREST RATES ON LOANS WITH A MATURITY OF MAXIMUM ONE YEAR

(Percentages)



Sources : ECB, NBB.

For new short-term loans to corporations of more than 1 million euro – which mainly concern the large firms' segment – the financing cost has declined since the beginning of 2003 in line with the reduction in risk-free interest rates. It is also apparent that rates charged by Belgian banks for this category of loans have been lower than the average for the euro area in 2003. Furthermore, the differential between rates applied to small and large short-term loans is also smaller in Belgium, relative to other European countries. However, it has to be remembered that those pricing differentials can be due to a number of factors, including differences in collateral practices.

To manage their credit risks, banks increasingly rely on the fast expanding market for credit derivatives. Table 3 reports the results of a survey conducted by the BFIC on both Belgian banks and insurance companies. This survey

TABLE 3 USE OF CREDIT DERIVATIVES BY BELGIAN FINANCIAL INSTITUTIONS

(Consolidated figures, notional amounts in billions of euro)

	December 2002				December 2003			
	Banks		Insurance		Banks		Insurance	
	Protection bought	Protection sold	Protection bought	Protection sold	Protection bought	Protection sold	Protection bought	Protection sold
Total return swaps	3.1	0.3	...	0.2	0.4	0.1	...	0.3
Credit default swaps	41.2	27.0	...	...	42.8	37.1	...	...
Credit spread options	...	0.2	...	0.7	...	...	...	0.6
Credit linked notes	1.6	9.9	...	0.7	1.6	12.7	...	1.9
Total	**45.9**	**37.4**	...	**1.6**	**44.8**	**49.9**	...	**2.8**

Source : BFIC.

indicates that the amount of credit risk protection bought by Belgian banks on this new market levelled off in 2003. At the same time, those intermediaries further increased their sales of protection so that their net position, as measured by the notional amount of total return swaps, credit default swaps, credit spread options and credit linked notes, had been reverted at the end of 2003. Although increasing, the participation of Belgian insurance companies in this market remains quite limited and is confined to the sell side.

Despite its growth, the credit derivatives market remains rather small, and mostly covers large companies. It is difficult for Belgian banks to use those instruments to transfer their credit risks on SMEs, which are still to a large extent kept on the books until maturity.

After a sharp increase in 2002, value adjustments on and provisioning for non-performing assets decreased somewhat in 2003. This general trend, however, conceals quite different movements for the various asset categories (Chart 23).

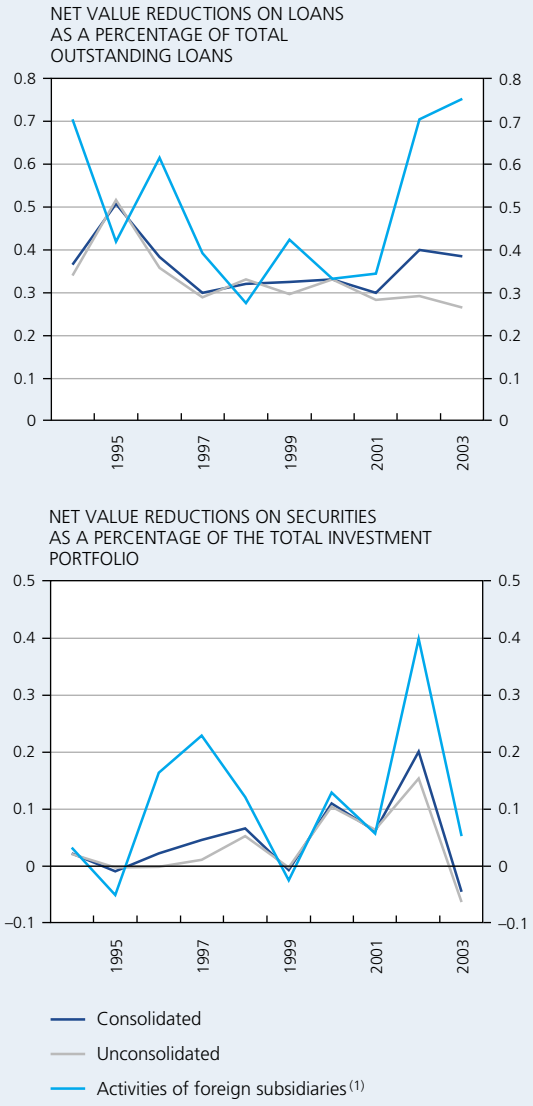
The reduction is mainly attributable to the recent price increases on most securities markets. While the depressed conditions of 2002 had forced banks to book significant value adjustments on their equities portfolio, the upturn on stock markets allowed Belgian banks to reverse part of those provisions in 2003.

Although they are subject to large fluctuations, value reductions on the securities portfolio remain, on the whole, much smaller than the ones on the loan book. The latter decreased slightly in 2003, but on a consolidated basis, with a level of around 40 basis points, they remained well above the average of around 30 basis points recorded in the period from 1997 to 2001.

It is striking to observe that this upward trend in the consolidated figures does not appear in the unconsolidated accounts. The difference between the two accounting bases provides a good approximation of the provisions which have had to be recorded for activities of foreign subsidiaries. Those provisions were much higher in 2002 and 2003 than during the preceding years. In particular, a large Belgian banking group recorded substantial value reductions in 2003 on the loan portfolio of its Polish subsidiary.

This is not the first time that Belgian banks have had to constitute higher provisions on some of their foreign loans. As illustrated by the upper panel of Chart 23, this was also the case in 1994, 1996 and 1999. On those three occasions, however, the upswing in the provisions did not contribute to any substantial gap between consolidated and unconsolidated figures, in sharp contrast with the developments observed in 2002 and 2003. This difference mostly reflects a volume effect. The loan portfolio of Belgian banks' subsidiaries abroad has risen significantly in recent years, increasing the vulnerability of the Belgian banking system to developments in some foreign markets.

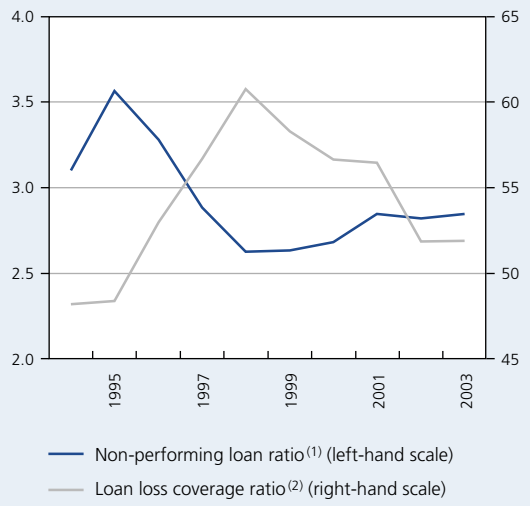
CHART 23 VALUE ADJUSTMENTS ON AND PROVISIONING FOR NON-PERFORMING ASSETS



Sources : BFIC, NBB.
(1) Value reductions on the activities of foreign subsidiaries have been estimated as the difference between consolidated and unconsolidated figures.

CHART 24 NON-PERFORMING LOANS

(End of year unconsolidated figures)



Sources : BFIC, NBB.

(1) The non-performing loan ratio is the stock of defaulted and uncertain loans as a percentage of total loans to customers and loan commitments.

(2) The loan loss coverage ratio is the stock of value reductions on loans and provisions for loan losses to the stock of defaulted and uncertain loans.

In comparison, the value reductions on domestic loans have been remarkably stable since 1997, staying at around 30 basis points despite significant changes in economic conditions. This stability in the annual provisioning rate in fact conceals quite strong fluctuations in the underlying percentage of non-performing assets and the degree of provisioning (coverage ratio)(4), which have tended to be inversely correlated in the past. At the end of 2003, the outstanding stock of non-performing domestic loans amounted to 2.8 p.c. of the total portfolio while the coverage ratio was about 52 p.c. (Chart 24).

3.2 Interest rate and liquidity risks

The intermediation and asset transformation activity of banks exposes them to two main risks, interest rate risk and liquidity risk. Those two risks are not always combined, as maturity mismatch does not need to be automatically associated with repricing mismatch(5). Indeed, a bank can borrow short to lend long, and still match repricing characteristics of its assets and liabilities by swapping long-term fixed interest rates against short-term variable rates. Nevertheless, as evidenced by Chart 25, there is a close link between Belgian banks' net positions according to the residual term to the next interest rate review and according to the ultimate maturity. Indeed, the gaps for the various time bands distinguished in the chart are quite similar for the two concepts, even if some differences can be detected.

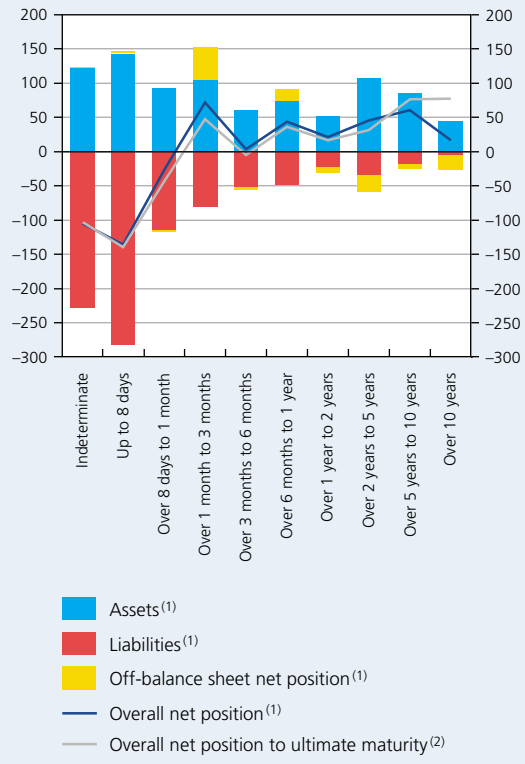
First, banks use derivative products to manage their interest rate positions which may thus diverge from the end maturity positions. It is a significant point that, on the money market, these products sometimes contribute towards an increase in banks' net interest rate positions. This is especially the case for the maturity bands "more than 1 month up to 3 months" and "more than 6 months up to 1 year". Conversely, for maturities higher than 1 year, off-balance-sheet products are systematically used to limit net interest rate positions.

(4) Exhaustive data on non-performing loans of Belgian banks are only available on an unconsolidated basis which does not permit the same kind of analysis for the provisioning policy of foreign subsidiaries of Belgian banks.

(5) The article "Interest rate risk in the Belgian banking sector" in this FSR distinguishes between the two concepts of maturity-mismatch and repricing-mismatch. This article also presents and discusses various measures of aggregate interest rate risk exposures, thus complementing the analysis of this section.

CHART 25 INTEREST RATE AND MATURITY MISMATCH

(End 2003 unconsolidated figures, billions of euro)



Sources : BFIC, NBB.

(1) Those data are classified according to the residual term to the next interest rate review, thus corresponding to the interest rate mismatch.

(2) Corresponds to the maturity mismatch.

Second, for the longest time horizon (more than 10 years and, to a lesser extent, 5 to 10 years), banks can reduce their repricing mismatch by resorting to contracts with intermediate interest rate revisions. Such an option is increasingly used on the Belgian mortgage markets where contracts with rate revisions every 1, 5 or 10 years are increasingly replacing the classic formula of 20 year fixed interest rate loans.

However, an analysis of the relation between the interest rate and the liquidity positions must go beyond a mere comparison of the two gap structures. Indeed, a large proportion of Belgian banks' long-term assets (e.g. the portfolio of government bonds) can be mobilised quickly on very liquid markets. On the other hand, short-term liabilities, such as sight and savings deposits, can to some extent be treated as long-term resources.

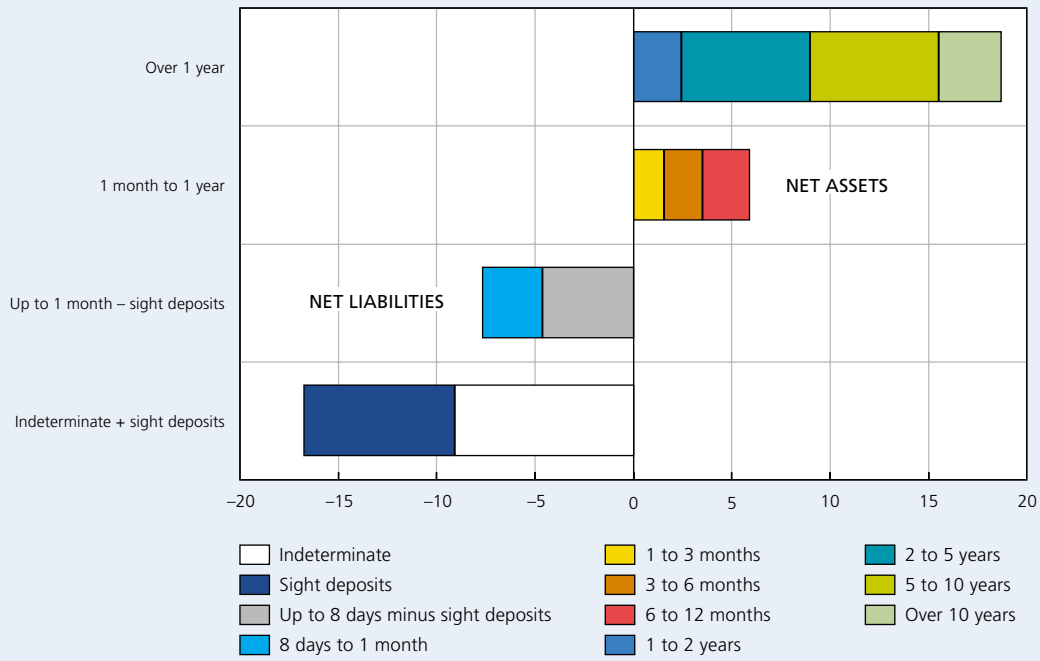
Banks take those characteristics into account in their asset and liability management (ALM). Indeed, if we try to synthesise the maturity position to the next interest rate review in some key time bands, we can detect a kind of two tier structure in the maturity transformation role of Belgian banks (Chart 26).

On the money market (two inner maturity bands of Chart 26), during the period 1993 to 2003, banks have, on average, been net borrowers for maturities up to 1 month excluding sight deposits in order to finance assets with a maturity of over 1 month to 1 year. While those two inner bands probably reflect, to a large extent, the trading activities of banks, the two outer bands are more closely associated with the core business activity of attracting deposits to finance long-term assets. Indeed, if we add on to the sight deposits the net liabilities with an indeterminate maturity (which mainly correspond to banks' savings deposits), we observe that this double source of funds is used to finance net asset positions on the capital market (more than one year).

The average maturity positions illustrated in Chart 26 did not remain constant through time. Chart 27 shows the developments for the four maturity bands since 1993. While net liabilities with a maturity of up to 1 month (with the exclusion of sight deposits) have represented a rather stable proportion of about 10 p.c. of total bank balance sheets, sight deposits and net liabilities with indeterminate maturities (including savings deposits) have increased, in relative terms, from less than 10 p.c. of total bank balance

CHART 26 KEY TRANSFORMATION ACTIVITIES OF THE BELGIAN BANKING SECTOR (1)

(Unconsolidated figures, net position in percentages of total assets, average of quarterly data between end 1993 and end 2003)

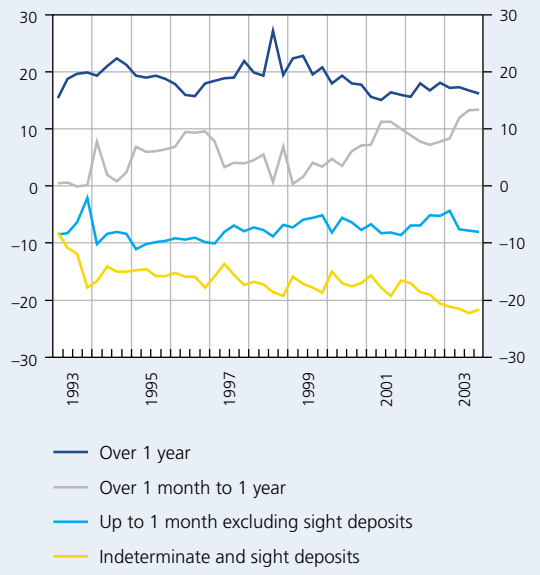


Sources : BFIC, NBB.

(1) Data according to the residual term to the next interest rate review date, thus corresponding to the interest rate mismatch. They include off-balance sheet net positions.

CHART 27 MAIN DEVELOPMENTS IN THE TRANSFORMATION ACTIVITIES OF THE BELGIAN BANKING SECTOR (1)

(Unconsolidated figures, percentages of total assets)

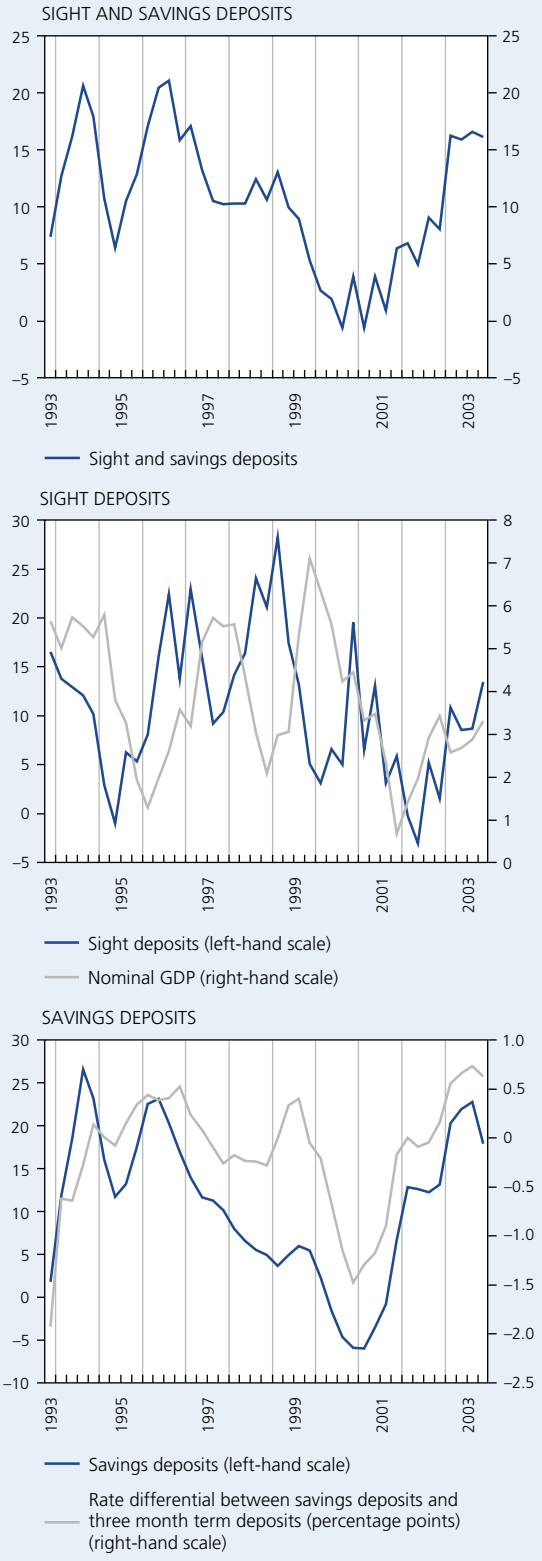


Sources : BFIC, NBB.

(1) Data according to the residual term to the next interest rate review date, thus corresponding to the interest rate mismatch. They include off-balance sheet net positions.

CHART 28 CHANGES IN OUTSTANDING AMOUNTS OF SIGHT AND SAVINGS DEPOSITS

(Unconsolidated figures, year on year percentage changes unless otherwise stated)



Sources : BFIC, NBB.

sheets at the beginning of 1993 to more than 20 p.c. at the end of 2003. This increase can be explained in part by the low interest rate environment combined with the favourable tax treatment of savings deposits.

These additional sources of funding have, however, not been used to finance larger positions on the capital market, as the net asset positions with a maturity of more than 1 year have recently decreased, going down from a maximum of 27 p.c. of total assets in September 1998 to 16 p.c. in December 2003. At the same time, banks have built up their net asset positions with a maturity of between 1 month and 1 year which had reached, at the end of 2003, a level comparable to that recorded for maturities of more than 1 year.

These developments clearly show that the distinction between two inner and two outer bands in the maturity structure must be drawn with caution. There is clearly no water-tight separation between the two categories of transformation activities. Nevertheless, this presentation is quite indicative of the main changes in the intermediation role of Belgian banks. It seems to indicate that, on the whole, the interest rate positions

taken by those banks have decreased somewhat during the last 10 years.

One of the key variables in the ALM policy of Belgian banks is undoubtedly the effective duration of deposits with indeterminate maturity. Chart 28 indicates that, during the last 10 years, banks have benefited from a structural increase in this source of funding. However, the rate of growth has been quite volatile and, in a few periods, banks have had to cope with a net decline in sight or savings deposits.

This was more specifically the case between mid-2000 and end-2001, when the outstanding amount of savings deposits temporarily decreased due to the emergence of an unfavourable rate differential in relation to 3 month term deposits. In fact there has traditionally been a close relationship between these two variables, as evidenced by the lower panel of Chart 28. However, to the extent that savings deposits and their alternative, 3 month term deposits, are constituted with the same banks, such a shift should not affect the overall funding volume.

The fluctuations in the rate of growth have been more pronounced for sight than for savings deposits. Those variations are also more difficult to foresee, as they cannot easily be associated with some key determinants. One potential candidate would be the rate of growth of nominal GDP which should influence the transaction demand for sight deposits. While we do indeed observe a close link during the recent period, this was far from always the case in preceding years.

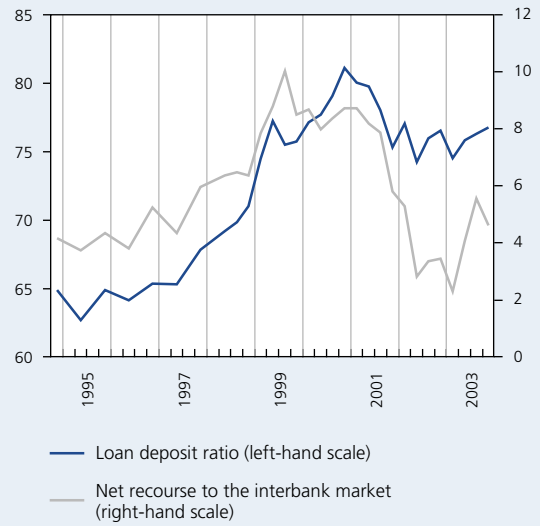
The fluctuations of sight and savings deposits do not tend to compensate each other. The upper panel of Chart 28 shows that the combined rate of growth of those two categories of deposits has decreased from a yearly rate of more than 20 p.c. at mid-1996 to almost 0 p.c. in 2000-2001. Since then, however, a strong reversal has taken place and the annual rate of growth again exceeded 15 p.c. in 2003.

Those changes in the banks' deposit collection activity do not necessarily match the variation in banks' lending activity. On the contrary, the decreasing trend in the growth of deposits between 1996 and 2000 has taken place in a period of strong economic growth and demand for credit, while the upward movement from 2000 is associated with an economic downturn.

Those timing differences can be illustrated by the change in the loan deposit ratio (Chart 29). We indeed observe an increase in this ratio between 1996 and 2000 which is reversed afterwards. This recent correction would have been more significant if not for a strong increase in mortgage loans which, as already commented in Chapter 2, has partially compensated low credit demand from corporations.

CHART 29 LOAN DEPOSIT RATIO [1] AND NET RECOURSE TO THE INTERBANK MARKET [2]

(Consolidated figures, percentages)



Sources : BFIC, NBB.

(1) Defined as loans and advances to customers as a percentage of deposits from and bank bonds of non-bank clients.

(2) Defined as the difference between interbank liabilities and interbank assets in percentage of total assets.

One of the major instruments that banks can use to align their sources and uses of funds is the interbank market. The net recourse to this market is indeed correlated with the movement in the loan deposit ratio.

The structure of the interbank market has changed significantly during the last 10 years, as analysed in an article in a previous FSR [6]. Increasingly, banks are considering their interbank transactions in an international perspective. As a consequence, a much higher proportion of those transactions than in the past is settled with foreign counterparts. Another new development is that large multinational banking groups are tending to centralise their liquidity management, thus modifying the nature of the relationship between the parent and its subsidiaries. Box 4 presents some of the key developments which have recently taken place in Belgium in this field and details some of the implications those developments could have for financial stability.

(6) "The Belgian interbank market : interbank linkages and systemic risks", FSR 2003.

Box 4 – Supervision of liquidity in complex banking structures

According to the European directive relating to the supervision of credit institutions, the home supervisor is responsible for the surveillance of all activities and risks of the foreign branches of a banking group, with the exception of liquidity which is controlled by the host authority, although in co-operation with the home supervisor. This segregation of responsibility has been introduced at a time when most branches in the EU were relatively small and in general not of systemic importance. However, when branches become systemically important in the host market, there can be some concern over the ability of the authorities to assume their responsibilities as regards the financial stability in their respective countries.

One example relates to the Nordea group's intention to transform its group structure (actually a holding company with subsidiaries) into a home bank in Sweden with branches in other Nordic countries. As these branches will account for a large share of the host market (40 p.c. of Finnish, 25 p.c. of Danish and 15 p.c. of Norwegian banking assets) they are undoubtedly systemic for these countries. Problems somewhere in the group will probably have an immediate impact on the bank as a whole and, consequently, on the financial stability of these different markets.

Potential problems are not limited to the implementation of a branch structure. They could also develop when parent banks provide formal or economic support for the liquidity of systemically important subsidiaries in other countries, as this implies a transfer of risk to the parent bank. This could be the case, for instance, if the liquidity management of those subsidiaries is fully integrated with that of the head office. Such structures have also been put in place by Belgian banks.

For example, one Belgian bank, with two foreign banking subsidiaries both systemically important on their local markets, has restructured the organisation of its professional activities. While trading rooms have been kept in those two subsidiaries, it has been decided that the administration and accounting of all transactions with professional counterparties would be centralised at the parent bank. The subsidiaries have been given a mandate to conclude deals in the name and for the account of the parent bank which is the only legal counterparty. As a consequence, the latter bears the credit and market risks related to transactions initiated by the trading rooms of its subsidiaries. Moreover, these subsidiaries no longer have a direct access to the professional market and their liquidity positions depend largely on the support of the parent bank, which has granted a formal liquidity line to one of those subsidiaries.

Another case relates to a financial holding company, with a banking subsidiary which is systemic for the Belgian financial market. This holding company has issued a guarantee letter covering all commitments of two other banking subsidiaries abroad. As a result of that formal guarantee, all risks taken by these two subsidiaries are supported by the holding company (and indirectly by the group's other main banking subsidiaries). If those subsidiaries are confronted with a solvency or liquidity crisis, the holding company will be legally obliged to support them.

Those structures do not only raise issues about the correct allocation of responsibilities between home and host country supervisors. They may also increase the risk of contagion in cases of liquidity or solvency crises. Therefore, there is a need for the host supervisor and central bank to co-operate more closely with the home supervisor and central bank, and to clearly define the role of each authority in cases of liquidity or solvency crises, in order to enable these authorities to assume their responsibilities as regards financial stability in their respective countries.

3.3 Profitability and solvency

The overall reduction in value corrections, emphasised in section 3.1, contributed in no small way to the improvement in Belgian banks' profitability. It was in fact the main factor contributing to the 15.3 p.c. increase in the net operating result in 2003, as the gross result, which excludes those value corrections, remained practically unchanged (Table 4).

In order to strengthen their profit and loss account, Belgian banks strive to improve control over their operational costs. A small increase in staff costs of 0.8 p.c., related among other factors to one-shot redundancy charges, has been more than compensated by a 4.1 p.c. decrease in other operating costs. This reduction is partly the outcome of synergies achieved via several mergers that took place in previous years; in particular, a large number of local branches have been closed down.

At the same time, Belgian banks are finding it difficult to enhance their income. Notwithstanding a slight improvement towards the end of the year, full year results stemming from intermediation activities were flat in 2003, reflecting subdued corporate lending activity in a lacklustre economic environment. Net non-interest income was down for the third consecutive year, mainly reflecting a further decrease in fee generating business.

As a consequence, the recent upward trend in the cost-income ratio of Belgian banks has hardly been reversed. In 2003 this ratio levelled off at about 74 p.c., i.e. a much higher level than the minimum of 66 p.c. achieved in 1998 (Chart 30).

The key indicators of banking sector soundness presented a favourable picture in 2003. The already mentioned increase in the net operating result led to a rise in the ROE from 11.8 p.c. in 2002 to 13.6 p.c. in 2003. Although much lower than the record levels reached in 1999 and 2000, this percentage compares quite favourably with the average results achieved in the recent past. The risk asset ratio of Belgian banks decreased slightly from 13.1 p.c. at the end of 2002 to 12.8 p.c. in 2003. However, the composition of this ratio further improved as the Tier-I ratio increased from 8.5 p.c. to 8.7 p.c.

An analysis of the distribution of Belgian banks' profitability, solvency and efficiency, weighted by the relative importance of the individual institutions' assets in the sector's total assets, does not reveal the existence of any large sub-set of banks facing more serious difficulties (Chart 31). For practically the entire banking sector, the ROE exceeded 10 p.c. in 2003 while the risk asset ratio was above 10 p.c. at the end of the same year. However, a not insignificant number of banks has to cope with a cost-income ratio higher than 80 p.c. This heralds once more

TABLE 4 MAJOR COMPONENTS OF THE INCOME STATEMENT OF BELGIAN CREDIT INSTITUTIONS (1)

(Figures on a consolidated basis, percentage changes compared to the previous year)

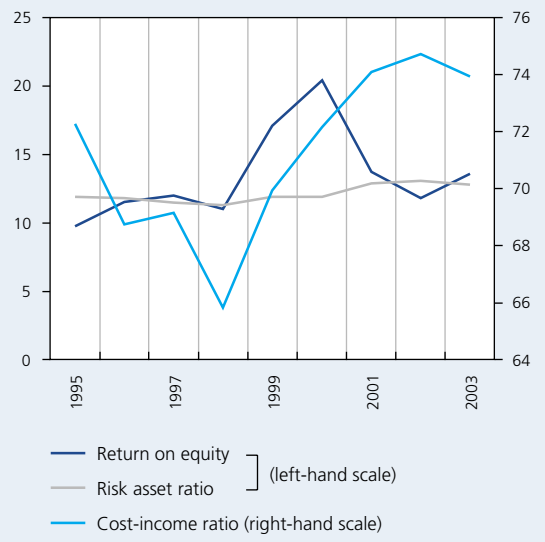
	2000	2001	2002	2003
Net interest income	3.0	4.6	3.2	0.0
Net non-interest income	28.5	–1.2	–11.7	–2.6
Banking income	**15.3**	**1.4**	**–4.6**	**–1.2**
Staff costs	11.7	6.7	–0.5	0.8
Other operating costs	24.9	2.3	–6.3	–4.1
Operating costs	**19.0**	**4.1**	**–3.8**	**–1.8**
Gross operating result	**6.8**	**–5.6**	**–6.9**	**0.1**
Value corrections	–9.6	4.6	36.2	–31.3
Net operating result	**12.3**	**–8.3**	**–20.2**	**15.3**
Consolidated result, part of the group	**50.6**	**–32.1**	**–15.2**	**14.3**

Sources: BFIC, NBB.

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

CHART 30 KEY SOUNDNESS INDICATORS OF CREDIT INSTITUTIONS GOVERNED BY BELGIAN LAW

(Consolidated figures, percentages)



Sources : BFIC, NBB.

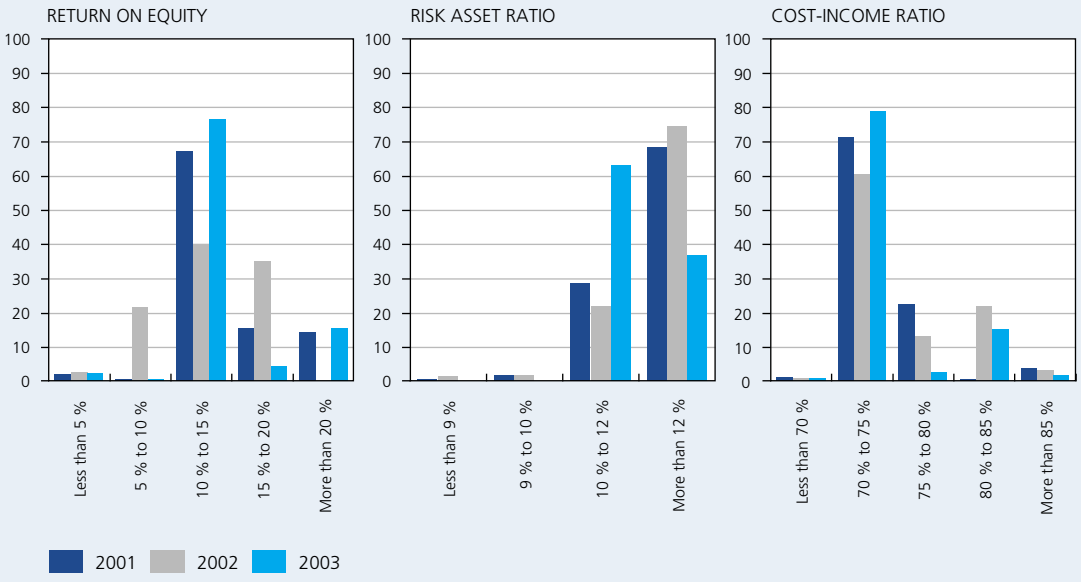
the double challenge faced by Belgian banks of keeping a grip on operational costs while boosting their income.

Intermediation activity remains by far the major source of revenue for the sector, as it still generates more than 50 p.c. of total banking income. Due to competitive pressures, the interest margin has traditionally been lower in Belgium than in the majority of other European countries. Since 1997, this margin has been widening (Chart 32). Although this is due partly to changes in the composition of the assets, with more high margin loans to foreign counterparts and less low-spread interbank positions, it also reflects changes in the credit policy of banks, which are aligning prices more closely with the risks for the various categories of loans.

This increase in spreads was also supported, during the last two years, by a steepening of the yield curve (Chart 33). As shown in Chart 32, there is indeed a correlation between the intermediation margin and the differential between long-term and short-term interest rates. Two factors have, however, tended to limit this positive effect of a steeper yield curve in 2002 and 2003. On the one hand, the decline in short-term rates to an historical low has

CHART 31 WEIGHTED DISTRIBUTION OF KEY SOUNDNESS INDICATORS OF CREDIT INSTITUTIONS GOVERNED BY BELGIAN LAW

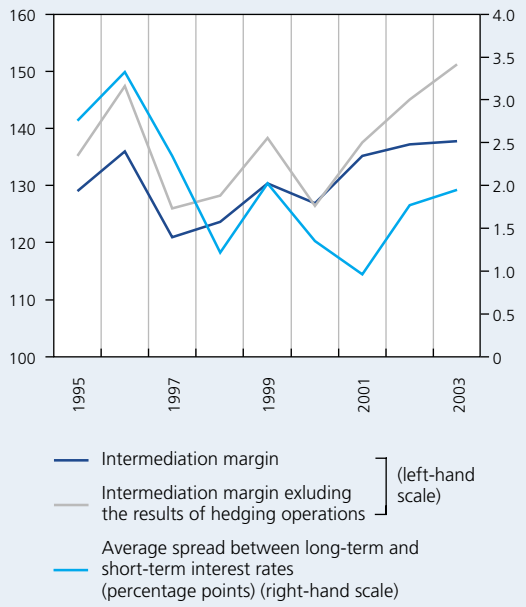
(Consolidated figures, percentages of total assets of credit institutions governed by Belgian law)



Source : BFIC.

CHART 32 INTERMEDIATION MARGIN OF BELGIAN BANKS (1)

(Consolidated figures; basis points, unless otherwise stated)



Sources : BFIC, NBB.

(1) The intermediation margin is calculated as the difference between the implicit interest rate received and paid on interest-bearing assets and liabilities respectively.

reduced the "endowment" effect, corresponding to the large margin that banks traditionally make on the portion of their sight deposits on which practically no interest is paid. On the other hand, the cost of hedging operations affected the intermediation margin to a greater extent than in recent years. In order to hedge part of the interest rate positions resulting from their maturity transformation function, Belgian banks make use of interest rate swaps, on which they pay a fixed long-term rate and receive in return a variable rate. When money market rates decline, as happened in 2003, the amounts received on these contracts become lower, without any corresponding change in the amount payable (Chart 34). Without these hedging transactions, the intermediation margin would have reached 151 basis points in 2003 compared to 137 for the margin including those hedging operations.

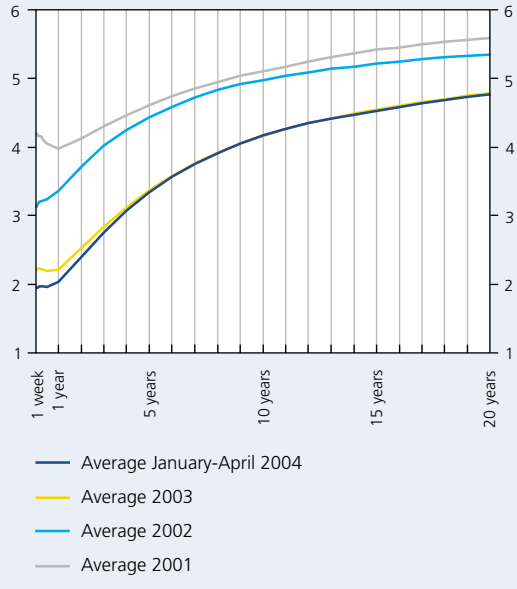
To complement their intermediation revenue, Belgian banks have been developing alternative activities. The bulk of that non-interest income comes from fee generating business, such as sales of investment funds, asset management or private banking. In the aftermath of the 2001 and 2002 fall in equity prices, private investors reverted to safer investments, and that depressed the development of those lines of business. As a consequence, fee income decreased for the third consecutive year, notwithstanding the recent growth, reported by some banks for the second half of the year 2003, in the commissions received on the sale, to households, of equity mutual funds with capital protection (Table 5).

Although less important, trading results can significantly affect the movement in bank income as they are often subject to sharp fluctuations. Not surprisingly, this source of income, related to wholesale banking activities, has reacted much more quickly to the improvement in securities markets conditions than the commission business, which is more linked to operations with retail investors. Trading results rebounded in 2003, increasing by 27 p.c.

Realisation of capital gains on the investment portfolio is related to current accounting practices. While securities in the trading book have to be marked to market, securities in the investment portfolio must be valued at amortised cost, with capital gains only being recognised in case of sales. By staggering the realisation of those gains, banks can smooth out fluctuations in their overall results.

CHART 33 YIELD CURVE IN EURO (1)

(Percentages)

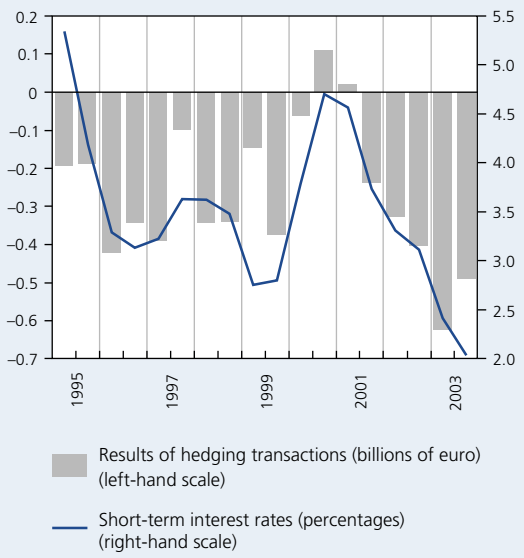


Source : NBB.

(1) Monthly averages of the reference interest rates on the secondary market in Belgian treasury certificates for maturities up to one year and in Belgian government bonds for other maturities.

CHART 34 RESULTS OF HEDGING TRANSACTIONS BY BELGIAN BANKS

(Half-yearly consolidated figures)



Sources : BFIC, NBB.

A new set of rules will be introduced, when the International Accounting Standards (IAS) will become applicable to the consolidated accounts of all Belgian credit institutions[7]. According to those new standards, all securities will have to be booked at market price, except for the fraction that banks commit themselves to hold to maturity[8].

To get an idea of the potential impact of these new accounting rules on the accounting results of Belgian banks, Chart 35 shows the movement in unrealised capital gains or losses due to the difference between the market and the book value of Belgian banks' investment portfolio. The size of this buffer appears quite sensitive to long-term interest rate variations. In the past, Belgian banks have benefited significantly from the downward trend in long-term interest rates, but those rates are now at an historically low level which means that the probability of new capital gains thanks to a further fall in rates is rather remote. Conversely, a rate increase could quickly cut down or even wipe out those hidden reserves, as happened in 1994 and 1999. It is also relevant to note that, while long-term rates are presently at a level comparable to the minimum reached towards the end of 1998, the total stock of unrealised capital gains is currently much lower, which indicates that banks have realised a large fraction of their existing hidden reserves in recent years.

A small, but far from negligible, proportion of those latent capital gains is associated with equity investments. As indicated by Chart 36 (whose scale differs significantly from that of Chart 35), those gains were nearly entirely eroded by the 1999-2002 bear cycle on the Belgian stock market.

Apart from market risk on the securities portfolios of their banking arms, the major Belgian bancassurance groups are also exposed to market risks through their insurance arms, which typically invest a larger share of

(7) According to the EU Directive, adherence to the IAS standard is only compulsory for the consolidated accounts of quoted credit institutions, but in Belgium this requirement will be extended to all consolidated accounts filed by banks.

(8) The article "Impact of IAS39 on asset and liability management and banks' capital ratios" in this FSR examines how, in this new environment, banks could still manage the volatility of their net income without modifying their asset and liability management or positions.

TABLE 5 NON-INTEREST INCOME OF BELGIAN CREDIT INSTITUTIONS (1)

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

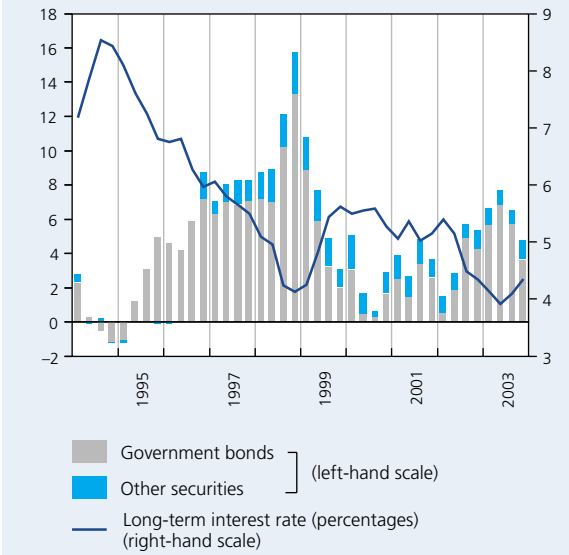
	2000	2001	2002	2003	p.m. Percentages of total non-interest income in 2003
Fee income	41.0	–4.0	–9.0	–1.5	61
Trading result	–	6.5	–54.5	27.0	6
Realisation of capital gains on the investment portfolio	–46.6	43.5	–5.4	7.5	11
Other	4.4	–8.6	–4.9	–14.8	22
Non-interest income	**28.5**	**–1.2**	**–11.7**	**–2.6**	**100**

Sources : BFIC, NBB.

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

CHART 35 UNREALISED CAPITAL GAINS ON SECURITIES HELD IN BELGIAN BANKS' INVESTMENT PORTFOLIOS (1)

(Consolidated figures in billions of euro, unless otherwise stated)

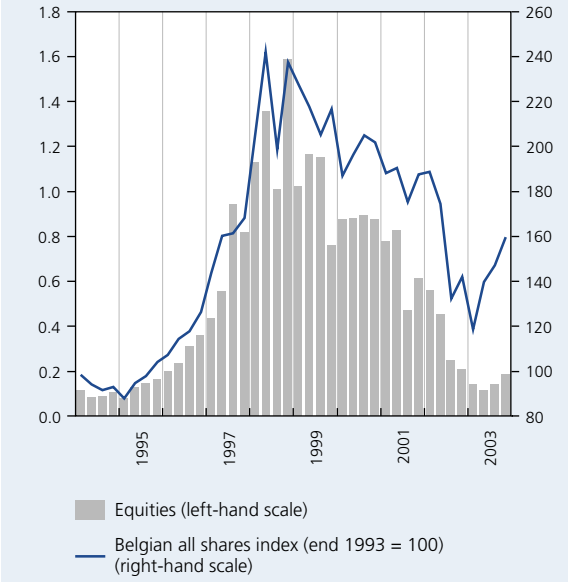


Sources : BFIC, NBB.

(1) Defined as the difference between the market value and the historical cost of quoted long-term securities (initial maturity over 1 year) in the credit institutions' investment portfolios.

CHART 36 UNREALISED CAPITAL GAINS ON EQUITIES HELD IN BELGIAN BANKS' INVESTMENT PORTFOLIOS (1)

(Consolidated figures in billions of euro, unless otherwise stated)



Sources : BFIC, NBB.

(1) Defined as the difference between the market value and the historical cost of quoted equities in the credit institutions' investment portfolios.

their investment portfolio in equities. In this connection, the sharp drop in 2002 in the weighted average ROE of the Fortis, KBC and Dexia groups – as reported in the published accounts of those groups – was indeed partly related to losses on equity investments in the insurance subsidiaries (Table 6). In 2003, this reported ROE rose again to 16.9 p.c.

Still, according to the accounts published by those three main financial conglomerates, developments in the solvency levels of the bank and insurance arms showed a contrasting pattern in 2003, with the former showing a slight decline to 12.1 p.c. of risk-weighted assets and the latter recording an increase to 220.8 p.c. of the minimum required margin. Despite the adverse developments on securities markets in 2001 and 2002, the three main Belgian financial groups have maintained good solvency levels in both branches of their activities, which has allowed them to remain resilient to the shocks affecting the global financial system in recent years.

This soundness is also reflected in the high and stable ratings of these institutions (Table 7). While Dexia Group has the highest rating, reflecting the low risk profile of its core business, lending to local authorities, Fortis enjoys a rating of A+ and KBC bancassurance holding company has an A-rating. In many cases there is, however, a difference between the ratings for the conglomerate and for the banking and insurance

TABLE 6 BELGIAN FINANCIAL CONGLOMERATES KEY INDICATORS (1)

(Percentages)

	Solvency ratios		Return on equity
	Insurance entity (2)	Banking entity (3)	
1999	272.0	12.5	17.6
2000	251.6	11.9	18.6
2001	213.4	13.0	17.3
2002	204.8	12.3	10.4
2003	220.8	12.1	16.9

Source : Annual Reports.

(1) Weighted average figures, according to balance sheet total for the Fortis, KBC and Dexia Group.

(2) Available solvency margin, as a percentage of the required solvency margin.

(3) Risk asset ratio.

TABLE 7 BELGIAN FINANCIAL CONGLOMERATES' RATINGS

	Moody's	S&P	Fitch
Dexia Group	Aa2	AA	AA+
Dexia bank	Aa2	AA	AA+
KBC Holding company	–	A	A+
KBC Bank	Aa3	A	AA–
KBC Insurance	–	A+	AA
Fortis Group	A1	A+	A+
Fortis Bank	Aa3	AA–	AA–
Fortis Insurance	–	–	–

Sources : FitchRatings, Moody's, Standard & Poors.

subsidiaries, the former generally having a lower rating than the banking and insurance daughter companies. Rating agencies tend to rate the ultimate holding company one notch below the operating subsidiary to reflect the fact that, in liquidation, the former is usually not supported [9].

4. Insurance companies

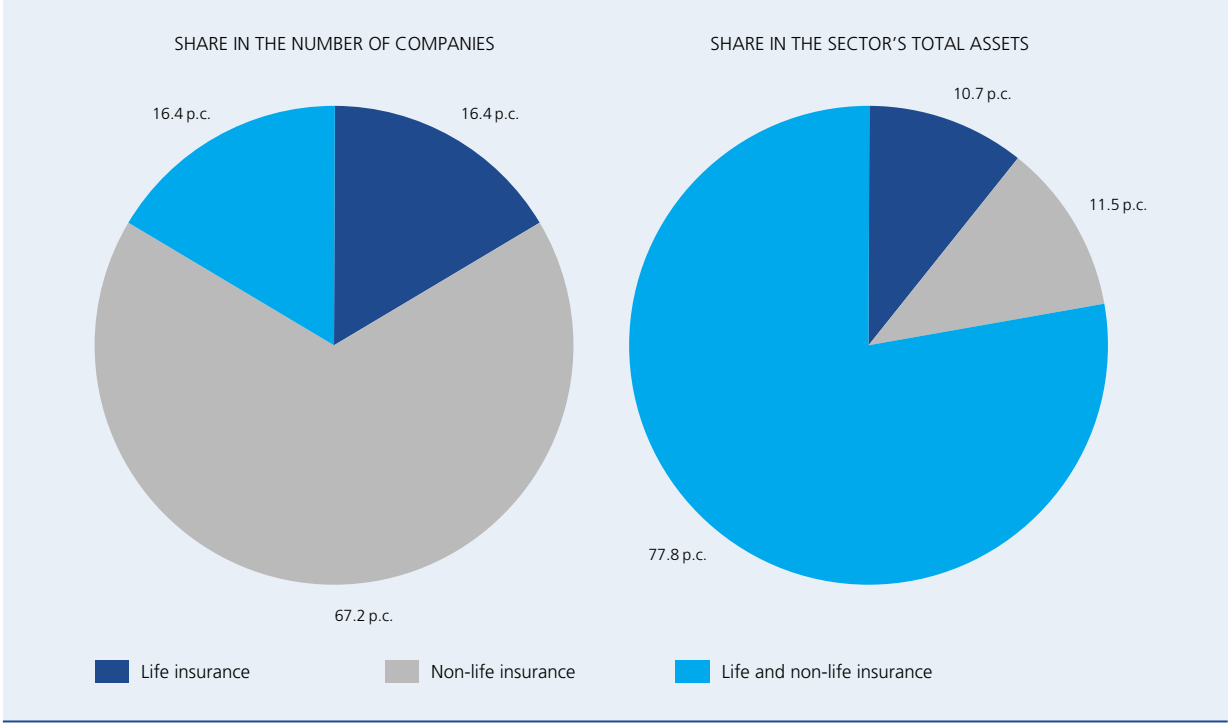
While financial stability analyses have traditionally focused on credit institutions, not least because of their central role in the payment system, problems in insurance companies can also have systemic implications. Indeed, as insurance companies are one of the major players on financial markets, difficulties in this sector have the potential to influence market conditions and significantly affect other market participants. This channel of contagion adds up to existing links between insurance companies and banks, which is a particularly relevant issue in the case of Belgium, where the major financial groups, and a number of others, are combining banking and insurance activities. The insurance arms of these bancassurance groups are typically active in both life and non-life insurance, and thus belong to the group of mixed insurance companies that dominate the Belgian insurance market in terms of total assets, notwithstanding their relatively limited number in comparison with that of companies specialising either in life or in non-life insurance (Chart 37)[10].

(9) FitchRatings : Criteria Report "Bancassurance rating criteria" August 2002.

(10) It may be recalled in this connection that since 1975, newly incorporated insurance companies are no longer allowed to combine life and non-life activities, while mixed insurance companies that existed at that time were allowed to continue to pursue both activities.

CHART 37 STRUCTURE OF THE BELGIAN INSURANCE MARKET BY INSURANCE COMPANIES' SPECIALISATION

(Percentages ; data at the end of 2003)



Sources : BFIC, NBB.

4.1 Profitability and solvency

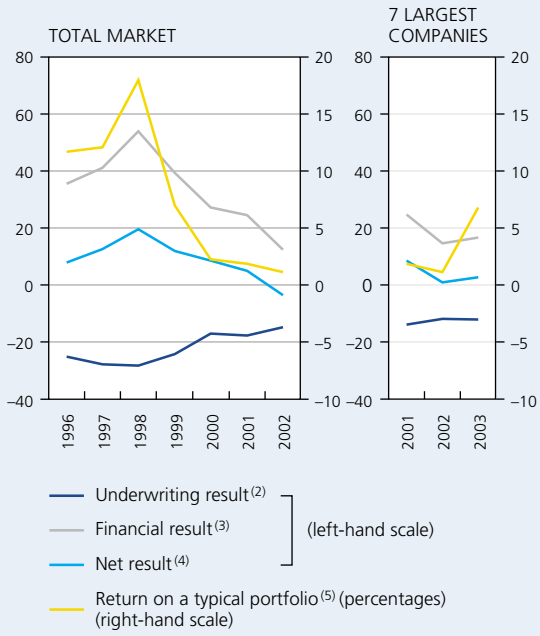
The unconsolidated annual accounts of the seven largest insurance companies, accounting for 57 p.c. of the sector's total assets and 56 p.c. of total premiums (38 p.c. in non-life and 66 p.c. in life insurance), show that the net result of these insurance companies slightly improved in 2003 to 2.8 p.c. of net premiums, compared to 0.9 p.c. in 2002 (Chart 38). This in turn reflected a stabilisation in the underwriting result and a small increase in the financial result. While accounting rules help explain why the increase in the financial result was much lower than the significant jump in the estimated return on insurance companies' investment portfolios (see Box 5 in this connection), the positive turnaround in this component of insurance companies' results may have relieved some of the pressures on insurers to achieve a further improvement in underwriting results in 2003. Indeed, notwithstanding the still modest overall net result, the composition of insurance companies' results has returned to a more sustainable situation, if compared to the large imbalances that were registered at the end of the nineties when extraordinarily high financial results were used to compensate large underwriting losses.

Although both life and non-life insurance activities have had to cope with a substantial decline in financial results in recent years, developments in the technical results of both branches, which comprise both the underwriting result and the net investment income allocated to that branch, have been driven by quite specific factors (Table 8).

The technical result in non-life insurance improved further in 2003, after a few difficult years resulting from a sharp fall in net investment income coinciding with substantial underwriting losses. Although those underwriting results are known to be cyclical, the magnitude of the underwriting losses had become very high at the end of the nineties and the beginning of the current decade. As long as net investment income remained high, these losses did not show up in the technical result, which reduced the companies' incentive to tackle the problem. It was only when financial income began to fall that insurance companies started to re-equilibrate their underwriting result by adjusting their premiums. In 2003 the result before investment income again approached break-even – up from –8.1 p.c. of premiums in 2002 –, as premium income rose more quickly than operating expenses and insurance costs (i.e. the sum of claims paid and the changes in the provisions for claims), both decreasing to respectively 31.9 p.c. and 69.3 p.c. of premiums. Investment income remained depressed, however, which makes it all the more important for companies to consolidate the improvement in their underwriting result.

CHART 38 MAJOR COMPONENTS OF BELGIAN INSURANCE COMPANIES' RESULTS

(Percentages of net premiums (1), unless otherwise stated)



Sources : BFIC, Thomson Financial Datastream, NBB.

(1) After premiums paid for reinsurance.

(2) Corresponds to the balance of the technical accounts in life and non-life insurance, excluding the financial results booked in these accounts. Corrected for provisioning as a result of changes in the value of defined contribution insurance contracts.

(3) Consists of the total net financial result, except the net financial income related to changes in the value of defined contribution insurance contracts.

(4) Includes, besides the underwriting and financial results, the balance of the other residuary transactions.

(5) Return on a portfolio with a structure comparable to that of Belgian insurance companies.

The technical result in life insurance, which is more sensitive to fluctuations in net investment income than the result in the non-life branch, also improved in 2003, from 1.2 p.c. to 4 p.c. of net premiums. Moreover, there is a complex interaction between the net investment income and the underwriting result in life insurance. Part of the net investment income in life insurance stems from changes in the value of investments underlying defined contribution (or branch 23) life insurance contracts, which leads to two peculiarities. First, accounting rules applying to those investments for which the risk is borne by the policyholders require all capital gains and losses to be immediately recorded in the income statement, in contrast to the rule for other investments (see Box 5). So, the sharp increase in investment income from –8.6 p.c. of premiums in 2002 to 28.1 p.c. in 2003 was mainly due to the change in the value of investments underlying defined contribution life insurance contracts. Second, these gains and losses ultimately belong to the policyholders who

TABLE 8 TECHNICAL RESULTS OF LIFE AND NON-LIFE INSURANCE ACTIVITIES

	Total market in 2002 (Billions of euro)		Seven largest companies (Percentages of net premiums)					
	Life insurance	Non-life insurance	Life insurance			Non-life insurance		
			2001	2002	2003	2001	2002	2003
Net premiums written	14.4	8.5	100.0	100.0	100.0	100.0	100.0	100.0
p.m. In billions of euro			*8.31*	*9.55*	*11.30*	*3.00*	*3.21*	*3.36*
Claims paid (–)	6.9	5.9	36.0	42.2	43.0	70.6	69.7	65.5
Change in the provisions for claims (–)	6.4	0.9	59.7	41.1	75.2	7.8	5.8	3.8
Premiums after insurance costs	**1.2**	**1.7**	**4.3**	**16.7**	**–18.2**	**21.6**	**24.5**	**30.7**
Net operating expenses (–)	1.1	2.7	7.0	6.9	6.0	33.9	32.6	31.9
Result before investment income (= underwriting result)	**0.0**	**–1.0**	**–2.7**	**9.8**	**–24.2**	**–12.4**	**–8.1**	**–1.2**
Net investment income	–0.3	0.7	9.9	–8.6	28.1	18.3	13.6	13.8
Technical result	**–0.2**	**–0.3**	**7.2**	**1.2**	**4.0**	**5.9**	**5.5**	**12.6**

Sources: BFIC, NBB.

bear the investment risk, which requires insurance companies to adjust the corresponding provisions for claims accordingly. As a result, provisioning rose from 41.1 p.c. of premiums in 2002 to 75.2 p.c. in 2003.

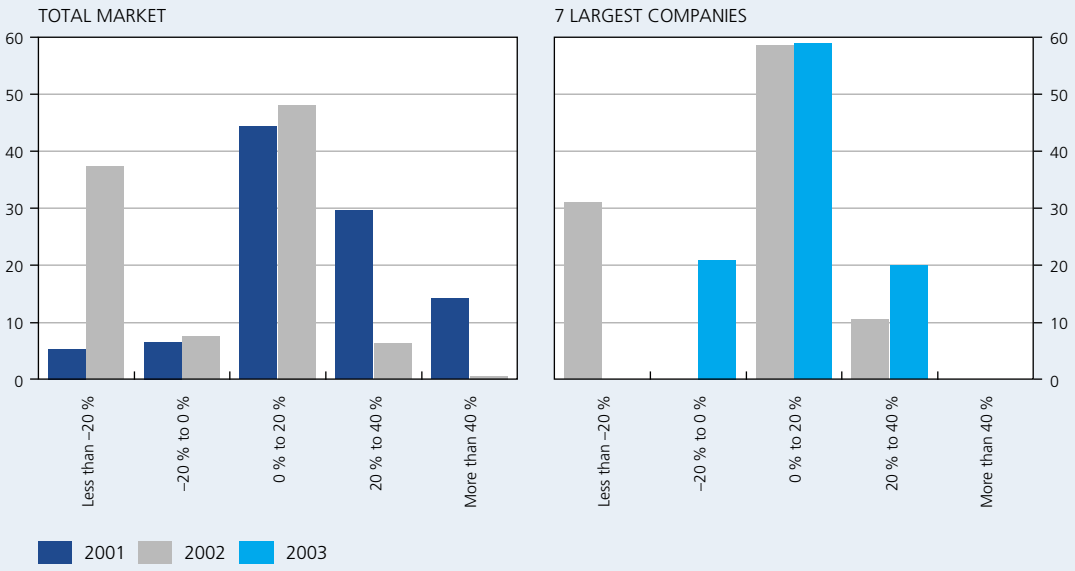
Excluding the impact of these defined contribution contracts, provisioning developed more in line with premiums, increasing from 63.9 p.c. of premiums in 2002 to 66.3 p.c. in 2003. Also net investment income would show smaller fluctuations and improve from 14.3 in 2002 to 19.2 p.c. of premiums in 2003.

While in 2002 the ROE for the insurance sector as a whole had dropped to –10.4 p.c. – with more than 40 p.c. of the sector recording a loss during that year – the results of the seven largest insurance companies in 2003 show an improvement in the ROE from 3.2 p.c. in 2002 to 9.2 p.c. in 2003. As indicated in Chart 39, this improvement in the average ROE for the sample was also reflected in a decline in the relative importance of loss-making companies and the size of their losses, as losses were concentrated in firms representing 20 p.c. of total sample assets (against 30 p.c. in 2002) and registering an ROE ranging between 0 and –20 p.c. (against less than –20 p.c. in 2002). In line with this more positive trend on the left-hand tail of the ROE distribution, the relative weight of companies registering an ROE of more than 20 p.c. also increased, to about one-fifth of total sample assets.

Thanks to the improvement in profitability, the available solvency margin increased slightly in 2003, while its composition changed somewhat (Chart 40). The first and most important part of this margin, called the explicit margin and mainly including insurance companies' own funds, improved from 173 p.c. of the minimum required margin in 2002 to 196 p.c. in 2003. This development was, however, largely compensated by a decline in the implicit part of the solvency margin, which consists partly of unrealised capital gains on insurers' investments. Insurance companies are allowed to include these unrealised capital gains in their implicit solvency margin after authorisation of the supervisor. The latitude available with regard to the inclusion of these unrealised capital gains can be used to smooth the level of the available solvency margin.

CHART 39 WEIGHTED DISTRIBUTION OF BELGIAN INSURANCE COMPANIES' RETURN ON EQUITY

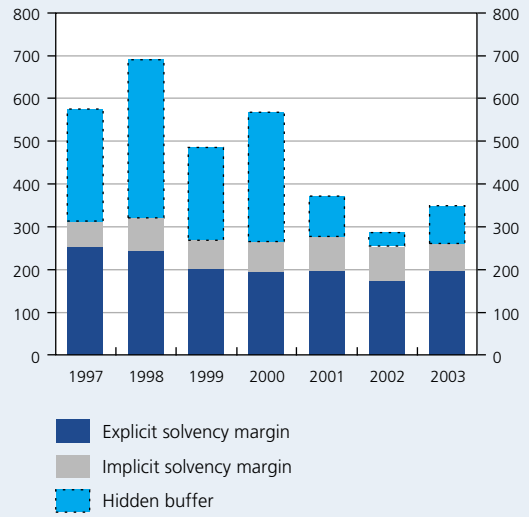
(Percentages of total assets)



Sources : BFIC, NBB.

CHART 40 AVAILABLE SOLVENCY MARGIN OF BELGIAN INSURANCE COMPANIES

(Percentages of the minimum required solvency margin)



Sources : BFIC, NBB.

The unrealised capital gains which do not form part of the implicit solvency margin constitute a so-called hidden buffer. As shown in Chart 40, this hidden buffer has absorbed the bulk of fluctuations in the market value of insurance companies' investments, declining from 304 p.c. of the minimum required margin in 2000 to 33 p.c. in 2002, before rising again to 89 p.c. in 2003.

This hidden buffer mainly results from the fact that insurance companies' accounting rules are not based on market valuation. These rules, together with their impact on the companies' solvency situation, are discussed in Box 5.

Box 5 – Rules for the valuation of insurance companies' investments[1]

At 87 p.c. of total assets, investments constitute by far the most important component of insurance companies' assets. They are to a large extent the counterpart of the provisions insurance companies have on the liabilities' side of their balance sheets, as these companies invest the premiums collected in order to be able to pay out claims the amount and/or timing of which are uncertain. In addition to this, investments are also the counterpart of insurance companies' own funds.

On the balance sheet, these investments are recorded at their acquisition cost, corrected, under certain conditions, for unrealised capital losses or gains. However, the method of accounting differs for capital losses and gains on the one hand and for bonds and equities on the other hand.

While the recording of unrealised capital losses leads to a cost in the profit and loss account, the recording of unrealised capital gains does not influence the result, as these are added immediately to the revaluation reserve, which is part of the company's own funds. If market developments call for a reversal of the recorded unrealised gains or losses, the opposite entries have to be made (i.e. the recording of a revenue in case of the reversal of capital losses and deduction of the amount from the revaluation reserve in case of the reversal of capital gains).

Moreover, the conditions for the recording of unrealised capital gains and losses differ according to the type of asset. In the case of equities, insurance companies are obliged to book unrealised capital losses if these are judged to be durable, while they are allowed to book gains under the same condition. The definition of "durable" is left to the discretion of the company, which may lead to differences in valuation from one company to another. The rules have to be applied consistently over time, however.

In the case of fixed income securities and receivables, unrealised capital losses only have to be recorded if they are related to credit risk (i.e. in the case of uncertainty surrounding full repayment). Capital losses as a result of interest rate increases are not recorded, except in the case of perpetuities and bonds serving as liquidity support, which constitute only a small share of the overall bond portfolio. Unrealised capital gains are never recorded.

The left-hand panel of Chart 1 summarises the differences between the market and the book value per main type of investment in p.c. of the book value. Although the latter is generally lower than the market value, the equity portfolio was overvalued in insurance companies' accounts in 2002. Such a negative difference between the market and the book value has to be recorded either at realisation or if judged to be durable.

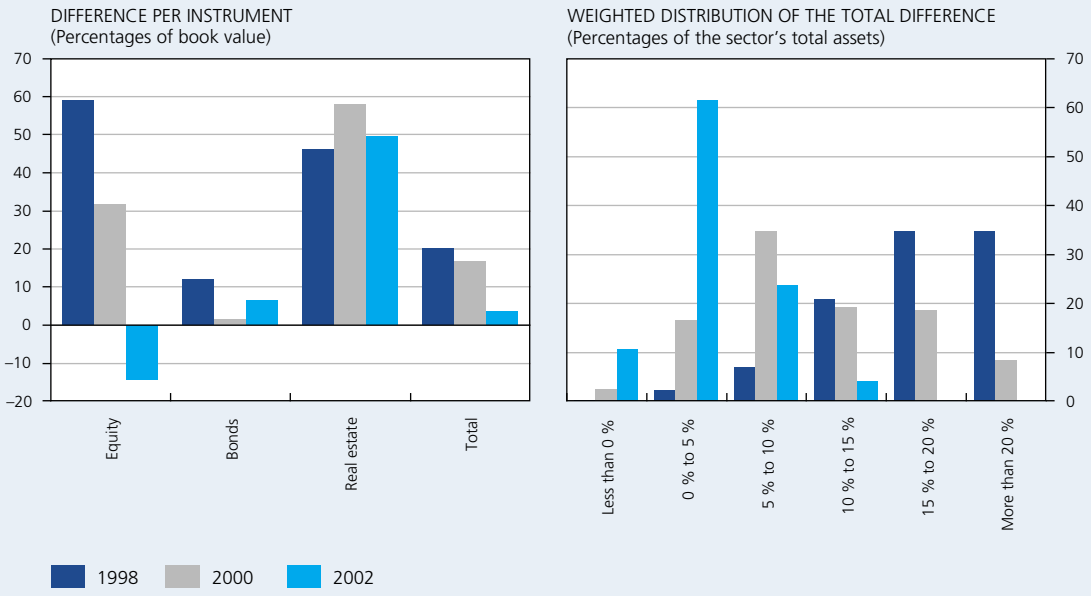
While the negative gap on the equity portfolio was a significant percentage of the book value of this type of assets, in absolute values (–2.3 billions of euro) it was still smaller than the surplus value on the bond portfolio (3.9 billions of euro). Yet, as to the latter, the limited positive difference in terms of percentage of the value of the bond portfolio can be wiped out by even a modest swing in interest rates.

While in 1998, around 70 p.c. of the companies, weighted by the relative size of their assets, recorded a positive difference of more than 15 p.c. between the market and book value of their investments, in 2002 no company recorded such a large difference, while more than 10 p.c. of the market had to cope with a negative gap (right-hand panel of Chart 1). 60 p.c. of the market registered a small positive difference of between 0 and 5 p.c.

The valuation rules discussed above also have an impact on the level and composition of insurance companies' reported solvency margin. While unrealised capital gains and losses recorded on the balance sheet feed into the explicit margin via the retained earnings (in the case of capital losses) or via the revaluation reserve (in the case of

(1) The rules described in this box apply to all investments of which the risks are borne by the insurance company. These exclude investments linked to defined contribution contracts, which are booked at market prices, with changes in the market value immediately recorded in insurance companies' profit and loss account and balance sheet.

CHART 1 DIFFERENCE BETWEEN MARKET AND BOOK VALUE OF INVESTMENTS [1]



Sources: BFIC, NBB.
(1) Excluding investments underlying branch 23 life insurance contracts.

capital gains on equities), the unrecorded positive valuation differences can be included in the implicit margin after authorisation by the supervisor. However, unrecorded capital losses are not deducted from the implicit margin. The part of the valuation differences that is not included in the solvency margin in either of the afore-mentioned ways constitutes a "hidden buffer" (cf. Chart 40).

Table 1 summarises the most important valuation rules for shares and fixed income securities, with their impact on the balance sheet, the profit and loss account and the solvency margin.

Listed Belgian insurance companies – in common with all listed companies – will have to prepare their consolidated statements according to the new International Accounting Standards (IAS) as of the year 2005.

In the case of insurance companies, these new rules are likely to be introduced in two phases. During the first phase, starting in 2005, insurance companies will use IAS 39 for the valuation of their financial assets and liabilities. This standard requires the recording of financial instruments at their fair value, which in most cases corresponds to their market value. Insurance contracts on the other hand will be subject to the rules laid down in the specific standard IAS 4, according to which current Belgian valuation principles, that are mainly based on actuarial calculations and fixed discount rates, will remain valid, although some minor changes will be introduced, such as the requirement to disclose the insurance contracts' fair value as of 2006. The asymmetry in valuation principles for assets and liabilities could lead to large swings in companies' profits and/or solvency, depending on the classification of financial assets as held for trading, available for sale (which seems to be the most likely option) or held to maturity. However, the standard setters recently decided to allow insurance companies to use market based discount rates for the calculation of provisions, if these are backed by fixed income securities. This could help ease the problems that may be encountered in the transitional period as a

TABLE 1 IMPACT OF THE INVESTMENT VALUATION RULES ON THE BALANCE SHEET, PROFIT AND LOSS ACCOUNT AND SOLVENCY MARGIN

		Impact on the balance sheet	Impact on the income statement	Impact on the solvency margin
Bonds	Unrealised capital losses	Value reduction only in case of credit risks (compulsory)	Yes	Negative impact on the explicit margin
	Unrealised capital gains	No	No	Possible positive effect on the implicit margin
Equity	Unrealised capital losses	Value reduction if the market value is durably lower than the book value (compulsory)	Yes	Negative impact on the explicit margin
	Unrealised capital gains	Value increase if the market value is durably higher than the book value (voluntary)	No	Positive impact on the explicit margin if booked in the revaluation reserve, or otherwise possibly on the implicit margin

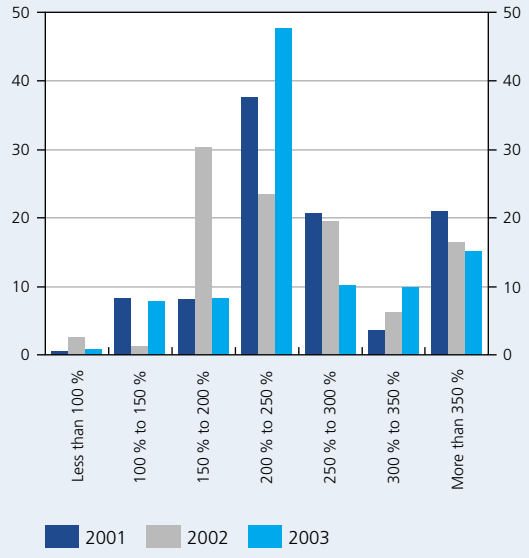
result of the use of different valuation bases for assets and liabilities. In the second phase, a more fundamental review of the valuation principles for insurance contracts is expected to take place, which could lead to the introduction of full fair value accounting.

Weighted by the relative importance of their total assets, a majority of insurance companies at the end of 2003 had a total (i.e. explicit plus implicit) solvency margin of more than 200 p.c. of the minimum required level (Chart 41). In 2002, the sector's losses had depressed solvency levels to lower rates for about 30 p.c. of the market. This percentage fell to around 15 p.c. in 2003, while the part of the sector that had a solvency level lower than 100 p.c. hardly amounted to 1 p.c., down from 2.6 p.c. in 2002. Yet, the decline in the solvency level as a result of the sector's underperformance in 2002 and 2003 would have been bigger if not for additional capital injections by shareholders in some insurance companies.

Although virtually all companies have solvency levels that are far higher than the required minima, this does not per se point to a very strong solvency situation. Indeed, the required minimum does not account for all types of risks, such as those related to the composition of the investment portfolio. In this sense, one should remain cautious when judging the solvency of insurance companies solely on the basis of the ratio between the required and the available margin, while other measures, related to the concept of economic capital, might also provide useful information.

CHART 41 WEIGHTED DISTRIBUTION OF BELGIAN INSURANCE COMPANIES' AVAILABLE SOLVENCY MARGIN

(Percentages of the sector's total assets)



Sources: BFIC, NBB.

Research tends to indicate that in Belgium, as in several other countries, the current required margin could well be significantly lower than the capital level desirable from an economic point of view. (11)

4.2 Investment portfolio and financial results

Investment strategies are a key driver of insurance companies' profitability and, at the same time, one of the main channels through which those companies could have a systemic impact on financial markets. So it is important to analyse in more detail the composition and profitability of the sector's investment portfolio.

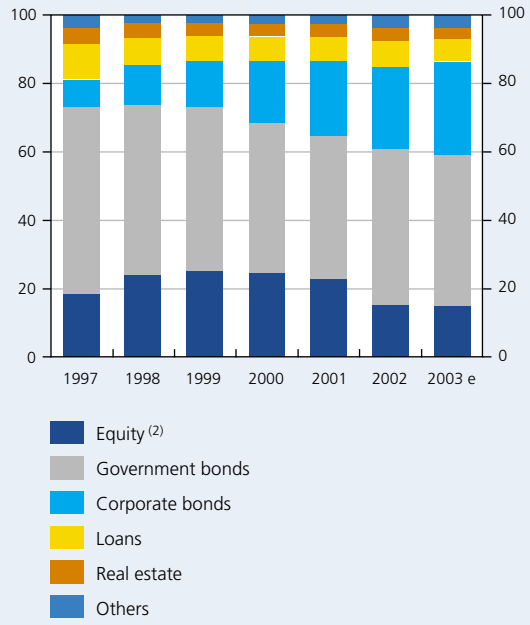
While partly reflecting the rise and subsequent fall in the value of the equity portfolio, the changes in the structure of insurance companies' investment portfolios were also due to changes in asset allocation, as those companies stepped up their investments in equities between 1997 and 2000 in order to increase investment yields in a context of falling interest rates, booming equity markets and stiff competition. This was followed, however, by a move in the opposite direction after the bursting of the equity bubble, as declining solvency levels limited insurance companies' capacity to absorb further losses on their equity portfolio (Chart 42). While some companies hedged their equity exposures, others sold part of their portfolio, investing the proceeds in bonds. As this shift took place in a low interest rate environment, this might put strains on future profits.

The shift towards fixed income securities, from 62 p.c. of the investment portfolio in 1998 to 72 p.c. in 2003, and the accompanying reduction in the share of equities, from 24 to 15 p.c. of this portfolio, may also have been fostered by insurance companies' aim to achieve a better balance between the duration of their assets and liabilities and their cash flow patterns, in a context where traditional life insurance contracts, with generally very long durations, are increasingly making way for more liquid contracts having shorter durations. In the particular case of contracts with guaranteed returns (branch 21), for instance, the annual guarantee, the short duration of usually eight years and the absence or low level of exit penalties for early withdrawals may have made investments in credit instruments of matching durations more attractive than investments in shares, whose volatility exposes the insurance companies to a higher investment risk.

(11) See for instance, for the case of life insurance, Mercer Oliver Wyman (2004), *Life at the end of the tunnel, the capital crisis in the European life sector*.

CHART 42 COMPOSITION OF BELGIAN INSURANCE COMPANIES' INVESTMENT PORTFOLIO (1)

(Percentages of the total investment portfolio, excluding investments covering defined contribution contracts)



Sources : BFIC, NBB.
(1) Valuation at market values.
(2) Equities include investments in UCIs (including these invested in bonds) and exclude shares in affiliated companies.

Notwithstanding these fluctuations in the structure of their investment portfolios, Belgian insurance companies always have been and still are heavily invested in bonds, and more specifically government bonds. However, in order to increase the yield of their bond portfolios, and backed by the deepening of the corporate bond market in the EU, insurance companies stepped up their investments in corporate bonds. In 1997 almost 90 p.c. of the bond portfolio was still invested in government paper, but by the end of 2003 this share had fallen to around 60 p.c. In addition, insurance companies also engage in the sale of credit protection, especially to credit institutions, as illustrated in Table 3 of Chapter 3, although the overall amounts so far remain limited.

The current low level of long-term interest rates poses a major challenge to insurance companies, especially given the large share of contracts with minimum guaranteed rates of return in life insurance. On these contracts, insurance companies, driven by strong competition, generally offered the maximum allowed guaranteed return, amounting to 4.75 p.c. until 1999, after which it was lowered to 3.75 p.c. More recently, most insurance

CHART 43 COMPARISON OF THE ESTIMATED AVERAGE GUARANTEED RETURN ON DEFINED BENEFIT LIFE INSURANCE CONTRACTS WITH THE LONG-TERM INTEREST RATE

(Percentages)

Sources: Thomson Financial Datastream, NBB.

(1) Rate on the secondary market for 10-year Belgian government bonds.

(2) For the calculation of the estimated guaranteed return, it was assumed that, while in 1999 all contracts enjoyed a guaranteed return of 4.75 p.c., at the end of 2003 45 p.c. of the outstanding contracts still had a guaranteed return of 4.75 p.c., 40 p.c. one of 3.75 p.c. and 15 p.c. one of 3 p.c. For the period in between a linear interpolation was applied.

(3) 80 p.c. of the average yield of 10-year government bonds on the secondary market over the last five years.

companies, forced by adverse market developments, again lowered the guaranteed rates for new contracts to around 3 p.c. However, an estimate based on reasonable assumptions indicates that the average guaranteed return on all outstanding branch 21 contracts currently lies slightly above 4 p.c.

Whereas long-term interest rates have traditionally been considerably higher than the average guaranteed return, the difference between the two has become structurally narrow, and at some points even negative, since 1998. This renders it more difficult for insurance companies to obtain sufficient investment income to meet the obligations attached to these contracts with guaranteed returns (Chart 43).

In order to anticipate possible future losses on these contracts as a result of low interest rates, insurance companies are obliged to constitute an additional provision in case the guaranteed return exceeds 80 p.c. of the average yield of 10-year government bonds on the secondary market over the last five years; this threshold was 3.94 p.c. at the end of 2003. Insurance companies are allowed to spread the allocations to this provision over a period of 10 years. However, insurance companies sometimes constitute additional provisions on their own initiative if they estimate that the required provision will be insufficient in their particular case. Although these provisions clearly improve insurance companies' financial strength, they do not alleviate the fundamental profitability problem related to these contracts.

As a matter of fact, while pushing up investment results by realising capital gains would lead to the depletion of the hidden buffers and would expose the companies to serious reinvestment risks, stepping up investments in equities would, on the other hand, increase the mismatch between assets and liabilities, as discussed above. Higher long-term interest rates would help to alleviate this constraint even if the move towards such a higher level would, in an early phase, lead to losses on the existing bond portfolio. Such losses would, however, be offset by a decline in the present value of insurance companies' liabilities.

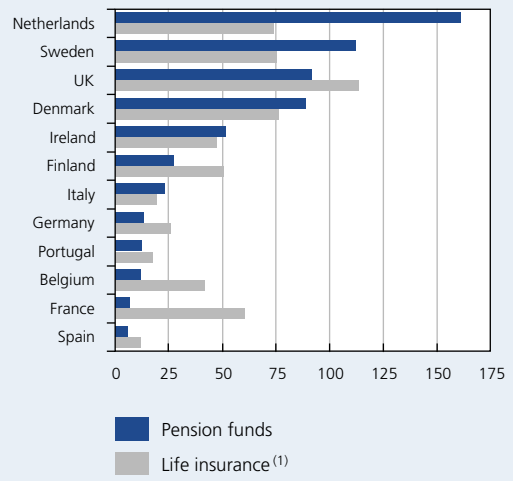
By making structural changes to some of their branch 21 insurance contracts, insurers are preventing new policies from adding to the already existing burden. First, while most contracts concluded a few years ago extended the guaranteed return valid at the time of conclusion of the contract to all future premiums, current contracts apply the guaranteed return valid at the time of receipt of the premiums (which may thus be adapted, if market conditions require). Second, new contracts generally guarantee lower returns, of between 3 and 2.75 p.c., while some contracts only provide capital protection. Those new contracts lower the average guaranteed return on the outstanding branch 21 insurance contracts. Besides an immediate positive impact on profitability, these changes will also lead to a reduction in the risk profile of insurance companies in the long run, as these new contracts limit insurance companies' future obligations.

The difficulty in servicing guaranteed returns in the face of low investment income also arises in the pension fund industry.

As in many other countries, the Belgian pension system consists of three pillars. The first, and by far the most important, is the state pension scheme, which is a "pay as you go" system in which no reserves are constituted in advance, so that people at work pay for the retirees' pensions. The second pillar comprises all collective private pension plans, organised on a company, sectoral or occupational level. It comprises pension funds as well as

CHART 44 ASSETS OF THE ALTERNATIVE PENSION PILLARS

(Percentages of GDP at the end of 2002)



Sources: W.M. Mercer, CEA, Commerzbank securities, The Economist.
(1) Comprises both individual and group life insurance.

group insurance, whose reserves amounted respectively to 14.5 billions of euro (5.4 p.c. of GDP) and 32 billions of euro (11.9 p.c. of GDP) at the end of September 2003. The third pillar covers households' individual retirement provisions, such as individual life insurance and investments in pension saving funds, whose combined assets represented about 24 p.c. of GDP at the end of September 2003. The size of Belgian pension funds is not only very modest compared to the other pension pillars, it is also much lower than in other European countries (Chart 44).

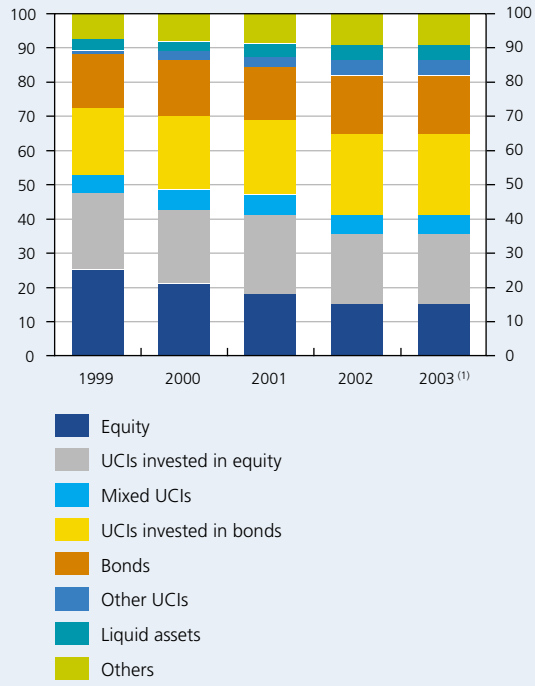
About one third of all pension funds in Belgium are defined contribution schemes, in which the final pension is determined by the level of the contributions and the movement in the value of the fund's assets. The other two thirds, whose relative weight in terms of total assets is even greater, are defined benefit schemes, which guarantee a pension determined by the plan's rules irrespective of market developments.

In the latter case, the plan's assets can fall short of the liabilities, e.g. as a result of unfavourable market conditions, forcing the sponsoring company to make additional contributions. Although, in the case of defined contribution contracts, the level of the pension is basically determined by financial market developments, the fund must still guarantee a minimum return, amounting to 3.75 p.c. on employees' contributions and, since the introduction of the new law on additional pensions in 2004, 3.25 p.c. on employers' contributions. As a consequence, all plans in Belgium should, to a certain extent, be considered as defined benefit plans as they all cover at least part of the investment risk. This means that in both systems the sponsoring companies are exposed to the risk of having to provide additional funding in order to be able to fulfil all their obligations.

To obtain higher investment yields, and as pension liabilities are generally long-term by nature, pension funds are major players on the stock markets, with around 40 p.c. of their financial assets being invested in equities, either directly or indirectly through the holding of shares in UCIs. The share of the equity portfolio has, however, decreased from about 50 p.c. in 1999, while the share of bonds rose from 36 p.c. at that time to around 40 p.c. in 2002 (Chart 45). Although this change partly reflects a fall in the value of the equity portfolio, it also indicates a shift in the funds' investment strategy as a reaction to the decline in pension funds' available buffers resulting from the bad performance of stock markets.

CHART 45 BELGIAN PENSION FUNDS' INVESTMENT PORTFOLIO

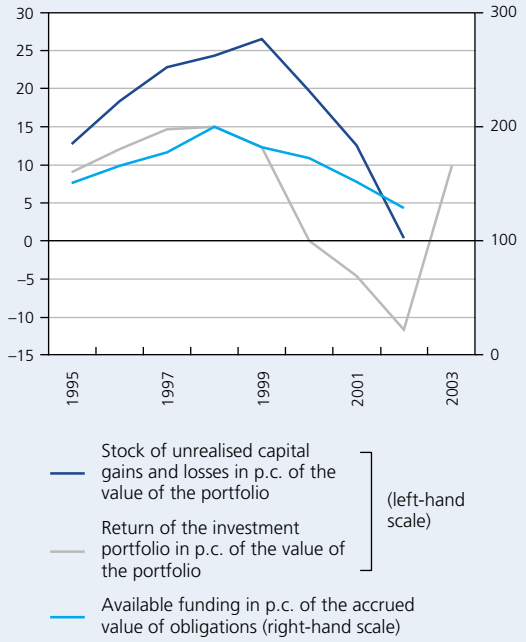
(Percentages of total financial assets)



Sources: BFIC, NBB.
(1) Data at the end of September 2003.

CHART 46 INDICATORS OF BELGIAN PENSION FUNDS' RESILIENCE

(Percentages)



Sources: BAPI, BFIC, NBB.

Indeed, as pension funds' investment accounting rules are based on market values, market movements led to a decline in the stock of unrealised capital gains on pension funds' balance sheets, from more than 25 p.c. of the investment portfolio in 1999 to almost zero in 2002. Obviously, this reduced the funding surpluses that were built up in the late nineties. However, unlike in some other countries, Belgian pension funds on aggregate are not showing a funding gap, as they still had on average around 30 p.c. more funding than needed to cover the current liabilities at the end of 2002 (Chart 46). However, the funding situation would have deteriorated more sharply if companies had not stepped up their contributions. In 2002 these increased by 37 p.c. compared to the year before. This may also be inferred from the fact that unrealised capital gains declined more steeply than the funding surplus. Although figures for 2003 are not available, the rise in the return on the investment portfolio suggests that the funding situation did improve, if anything, in 2003.

Notwithstanding the still comfortable situation on an aggregate level, a number of small funds had to cope with underfunding, all cases resulting in an agreement with the supervisor on an immediate or staggered adjustment through additional contributions. Moreover, when considering the funding levels of Belgian pension funds, one should bear in mind that, under current disclosure and valuation rules, the impact of market developments is not fully reflected in the present value of the pension funds' liabilities. Indeed, these liabilities are discounted on the basis of a fixed rate, whose current maximum is 6 p.c., and not on the basis of market interest rates, which have fallen significantly over the last few years. A decrease in the discount rate would raise the accrued value of pension funds' obligations.

5. Financial infrastructures

By facilitating the transfer of value between economic agents, the payment and securities settlement infrastructure plays a key role in the economy. The smooth functioning of this infrastructure has a significant impact on the efficiency of financial markets and on the real economy. The payment and securities settlement systems are also the channel through which problems encountered by one participant may affect other participants and trigger a chain reaction. Therefore, the payment and settlement infrastructure must be not only efficient but also secure.

Oversight of payment and settlement systems consists in setting up standards to minimise the inherent systemic risk and to promote the efficiency of the systems as well as in enforcing the implementation of these standards by the systems. The NBB is legally entrusted with the task of carrying out the oversight of payment and securities settlement systems located in Belgium, such as ELLIPS and Euroclear, as well as of the interbank financial telecommunication system SWIFT. The NBB also collaborates in the oversight of international systems located abroad, CLS and LCH.Clearnet.

The NBB participates in international bodies for the setting of standards. In 2003, these bodies published various documents containing guidelines on payment and securities settlement systems. A report by the Committee on Payment and Settlement Systems (CPSS) entitled *The Role of Central Bank Money in Payment Systems*, describing the role and possible uses of central bank money in payment systems, was published in April 2003. In June, the Payment and Settlement Systems Committee (PSSC) produced a document entitled *Oversight Standards for Retail Payment Systems*, which provides standards that retail payment systems of systemic importance must fulfil. A joint working group of the European System of Central Banks (ESCB) and the Committee of European Securities Regulators (CESR), launched in 2001, led to the publication, in August 2003, of a consultative document

TABLE 9 VALUE OF TRANSACTIONS
(Billions of euro)

	2001	2002	2003
CEC	508	431	552
ELLIPS	24,500	22,824	23,780
Banksys	32	36	47

Sources: Banksys, NBB.

entitled *Standards for Securities Clearing and Settlement Systems in the European Union*. This document transposes the CPSS-IOSCO *Recommendations for Securities Settlement Systems*[12] for the European Union.

In Belgium, three payment infrastructures are mainly active in the domestic market (Table 9): ELLIPS (the Belgian large-value payment system and access point for TARGET), CEC (the Belgian small-value payment system) and Banksys. The first two are operated by the NBB, the third by the private sector. Payment infrastructures with a more pronounced international character and relevant for the Belgian market are MasterCard Europe and CLS Bank.

TABLE 10 OUTSTANDING DEPOSITS IN THE DOMESTIC CSDS AND ICSD LOCATED IN BELGIUM
(Billions of euro, as of December 31)

	2001	2002	2003
CIK	189	127	120
NBB SSS	279	291	293
Euroclear	4,405	4,778	5,244
Of which:			
International Bonds[1]	3,110	3,276	3,509
Domestic bonds	1,054	1,291	1,445
Equities	80	81	96
Other securities	161	130	194

Sources: CIK, Euroclear Bank, NBB.
(1) Include Eurobonds, Euro Commercial Paper (ECP), Certificates of Deposit, Brady bonds and some SEC registered securities

In line with the decisions made at the level of the ESCB, both ELLIPS and the CEC have been subjected to an oversight assessment: ELLIPS against the G10 "Core Principles for Systemically Important Payment Systems" and CEC against the Eurosystem's "Oversight Standards for Retail Payment Systems".

Three securities settlement systems (SSS) are established in Belgium: the CIK[13], the NBB SSS and the Euroclear System. As shown by the data on outstanding deposits and turnover presented in Tables 10 and 11, these systems are very different in size.

CIK and NBB SSS are the two components of the Belgian domestic securities settlement infrastructure. CIK, a subsidiary of Euronext, is the Central Securities Depository (CSD) for securities issued by private entities, mostly equities and equity related instruments. It also operates two settlement systems, one that settles the Euronext Brussels on-exchange cash market transactions for which the Paris based clearing house LCH. Clearnet SA intervenes as a central counterparty, and one that settles over-the-counter transactions. The bad performance of the stock market has had a clear impact on the activity of CIK, as the reduction in the number of transactions on Euronext Brussels has led, over the past two years, to a sharp decrease in the value of outstanding deposits (–36.5 p.c.) as well as in the turnover (–24 p.c.) of CIK. The NBB SSS, the settlement system operated by the NBB, is the Belgian CSD for fixed income securities, in particular those issued by the Belgian State. Unlike CIK, NBB SSS saw both its deposits of securities and its turnover increase (respectively by 5 p.c. and by 29 p.c.) between 2001 and 2003.

A major international infrastructure is also established in Belgium, the Euroclear System. It is an International Central Securities Depository (ICSD) operated by Euroclear Bank, a Belgian credit institution. It settles trades in euro, US Dollar, Pound Sterling, Yen and 27 other currencies between more than 1,600 participants from about 80 countries. The core activity of the Euroclear System remains in the segment of international debt securities (e.g. eurobonds) which accounted for 67 p.c. of the 5,244 billions of euro of securities deposits held in the system at the end of 2003. To offer its participants the opportunity to access a large number of domestic securities markets, the Euroclear System has put in place a network of 31 links with local securities infrastructures and custodians. Deposits in such domestic bonds, which represent about 28 p.c. of the total securities deposits,

(12) CPSS-IOSCO (2001) "Recommendations for Securities Settlement Systems".
(13) Caisse Interprofessionnelle de Dépôts et de Virements de Titres S.A./ Interprofessionele Effecten Deposito- en Girokas N.V. (Inter-professional Securities Depository organisation)

TABLE 11 TURNOVER OF THE DOMESTIC CSDS AND ICSD LOCATED IN BELGIUM

(Billions of euro)

	2001	2002	2003
CIK	147	139	112
NBB SSS	2,939	3,063	3,788
Euroclear	86,900	103,500	118,100

Sources: CIK, Euroclear Bank, NBB.

have significantly increased over the past few years and their share in the turnover of the Euroclear System was close to 65 p.c. in 2003.

Since 2001, Euroclear Bank has merged with various domestic systems in Europe: Sicovam (now Euroclear France), the French CSD; Necigef (now Euroclear Nederland), the Dutch CSD and CRESTCo, the CSD of UK and Irish equities. Euroclear Bank also intends to acquire the settlement activities of the CIK in the near future. Euroclear plans to implement a "New Business Model" by consolidating the processing platforms of these various entities into one "Single Settlement Engine" and by creating a common infrastructure for the group.

In this framework, Euroclear also reassessed the corporate structure of the group and decided to reshape it in a way that should better fit this new model while addressing systemic risk, transparency and intra-group competition issues. The planned structure is to consist of a new company, to be called Euroclear S.A./N.V., incorporated in Belgium, of which Euroclear Bank and the CSDs of the Euroclear Group would become sister subsidiaries (Chart 47). Euroclear S.A./N.V. would own and operate the common platform and provide other shared group services including IT infrastructure. Participants in the various subsidiaries would continue to access them directly (as at present) and not through Euroclear S.A./N.V. The current user governance and ownership of the group would also remain unchanged. Euroclear expects the new structure, which is now being reviewed by the relevant regulators, to be in place by the end of 2004.

In line with the acquisitions of domestic CSDs, Euroclear has reinforced its role in the equities markets by concluding a privileged partnership agreement with Euronext N.V. for the settlement of transactions concluded on the Euronext trading platforms (Chart 48). In the framework of this agreement, Euronext N.V. has acquired 3 p.c. of the capital of Euroclear plc., the parent company of Euroclear Bank, while Euroclear Bank has taken a stake of 20 p.c. in LCH.Clearnet SA[14], a French credit institution acting as central counterparty and clearing institution for the transactions concluded on Euronext markets.

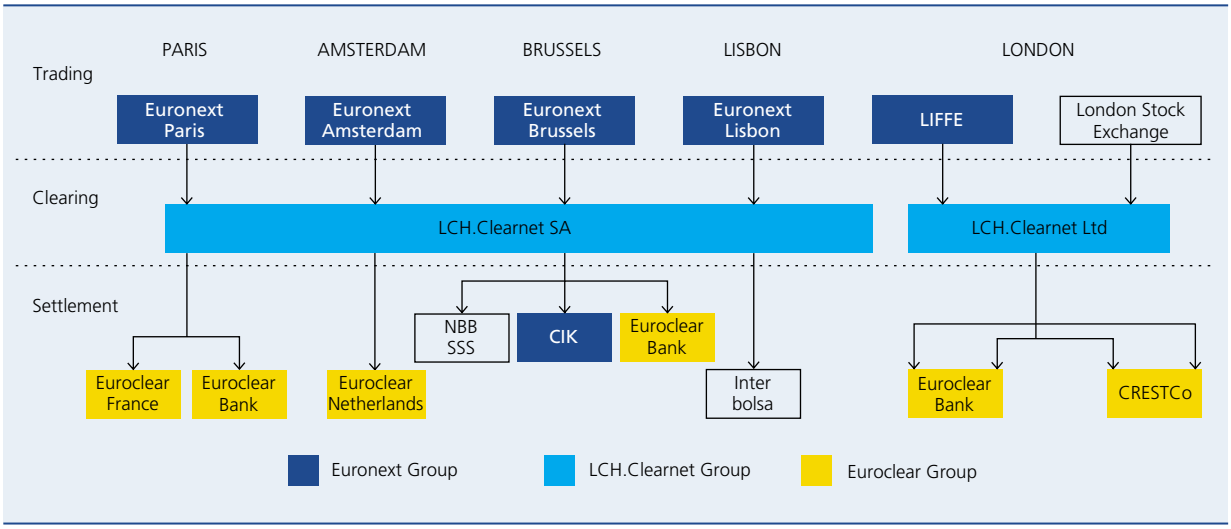
CIK, NBB SSS and Euroclear are overseen by the NBB. They are in the process of being assessed against the CPSS-IOSCO "Recommendations for Securities Settlement Systems". The NBB is also involved in the joint oversight of LCH.Clearnet along with the French, Dutch and Portuguese authorities.

Following the integration of foreign CSDs in Euroclear and the partnership agreement with Euronext, the NBB has set up an international co-operation framework with the foreign regulators in charge of the oversight of these entities. This co-operation is based on the conclusion of *Memoranda of Understanding (MoUs)*, which set out the

(14) Euroclear Bank's stake in Clearnet was converted into a 9.8 p.c. stake in the LCH.Clearnet Group after the merger with LCH in December 2003.

CHART 47 STRUCTURE OF THE EUROCLEAR GROUP

CHART 48 VALUE CHAIN FOR ON–EXCHANGE TRADES IN EURONEXT



terms of the co-operation and acknowledge the role of the NBB as lead overseer of Euroclear. Prudential supervisors and securities regulators are also parties to these agreements. The new structure that Euroclear will put in place creates the need to reshape this co-operation framework in order to take better account of the common functions and infrastructure centralised in Euroclear SA. The authorities are now in the process of elaborating this new framework.

While not a payment or settlement system, SWIFT plays a key role in the financial infrastructure by offering facilities for highly secure exchange of financial and related messages between its users. A growing number of systemically important payment systems have become dependent on SWIFT, which also provides the message transmission for bilateral correspondent banking activity. There has been formal oversight of SWIFT since 1998, based on a special arrangement agreed by the central banks of the G-10 countries. Under this agreement, the NBB acts as lead overseer of SWIFT, with the support of other G-10 central banks.

In the fourth quarter of 2003, the organisation of the oversight of SWIFT was reviewed and a new framework has been agreed in January 2004. The implementation of the revised oversight arrangements is ongoing: it includes a revision of the protocol concluded between the NBB and SWIFT, and the conclusion of MoUs between the NBB and the central banks co-operating in the oversight of this institution. The protocol with SWIFT contains practical arrangements for the organisation of the oversight, while the MoUs between central banks clarify their respective roles in the co-operative oversight of SWIFT. The terms of reference of the various groups involved with the oversight of SWIFT have also been reviewed.

In 2003, SWIFT messaging traffic continued to grow: for the first time, more than 2 billion messages were sent over the network in one year, with a peak day of 9.7 million messages. SWIFT returned 25 millions of euro in rebates to its users (on revenues before rebates of 577 millions of euro) and announced a significant price reduction. By the end of 2003, 25 p.c. of traffic had migrated from the old network infrastructure (based on a network technology that is rapidly becoming obsolete) to the new internet protocol-based infrastructure. All traffic should have migrated by the end of 2004. Overseers are closely monitoring this huge migration project.

To strengthen business continuity at the level of the Belgian financial sector as a whole, a "National Initiative for Business Continuity Planning in the Financial Sector" was launched. This group is chaired by the NBB. The members are experts from the NBB, the BFIC and the Federal Public Service Finance. In the initial stage, the mandate of this group contains three components: to identify the critical actors and functions in terms of business continuity and business recovery, to inquire about the measures already taken and to find out about the expectations of the actors regarding the measures which could be taken by the authorities or by others. In a second stage, the group will evaluate any deficiencies at sector level and, if appropriate, make proposals for remedying them.

Statistical annex

List of tables

Tables relating to credit institutions

Tables relating to insurance companies

Tables relating to investment services and securities market

TABLE 1 NUMBER OF BELGIAN CREDIT INSTITUTIONS

	1997	1998	1999	2000	2001	2002	2003
Credit institutions governed by Belgian law with Belgian majority shareholding	63	54	48	45	38	36	34
Credit institutions governed by Belgian law with foreign majority shareholding	31	27	27	27	29	29	27
– EU Member States	16	17	21	21	22	21	21
– other States	15	10	6	6	7	8	6
Belgian branches of foreign credit institutions	40	39	44	47	46	46	48
– EU Member States	25	25	30	34	35	36	38
– other States	15	14	14	13	11	10	10
Total	**134**	**120**	**119**	**119**	**113**	**111**	**109**

Source : BFIC.

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

	1997	1998	1999	2000	2001	2002	2003
Large credit institutions (including their subsidiaries)	21	18	17	15	14	12	11
Belgian financial groups	4	6	5	7	5	5	3
Financial groups from other EU States	16	18	21	19	18	19	18
Financial groups from third countries	14	8	5	6	7	5	6
Belgian or foreign non-financial groups	8	4	3	3	3	4	2
Family structure	12	14	13	10	8	9	10
Professional credit associations	12	11	9	9	9 (1)	9 (1)	9 (1)
Public authorities	2	2	2	1	1	1	1
Consortium structure	–	–	–	2	2	1	1
Limited partnerships	3	–	–	–	–	–	–
Co-operative companies	2	–	–	–	–	–	–
Total	**94**	**81**	**75**	**72**	**67**	**65**	**61**

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

TABLE 3 KEY FIGURES FOR THE BELGIAN BANKING SECTOR[1]

(Data on a consolidated basis)

	1997	1998	1999	2000	2001	2002	2003
A. Large banking groups							
Balance sheet total (billions of euro)	633.4	699.1	797.9	840.6	940.7	907.5	913.2
Customers' holdings (billions of euro)	341.6	380.5	415.2	440.5	477.0	465.4	453.9
Loans and advances to customers (billions of euro)	226.6	267.4	306.7	352.4	374.8	381.2	384.9
Off-balance-sheet forward operations (billions of euro)	1,751.7	1,870.9	2,377.3	2,451.7	3,113.6	3,639.3	4,484.4
Assets and deposits in trust (billions of euro)	406.3	586.2	647.7	927.6	961.7	932.7	739.0
Risk asset ratio (p.c.)	11.3	11.1	11.8	11.7	12.7	12.8	12.4
Net after tax results (billions of euro)	1.9	2.0	3.2	4.7	3.4	2.9	3.6
Return on average assets (p.c.)	0.3	0.3	0.5	0.6	0.4	0.4	0.4
Return on average equity (p.c.)	13.5	11.7	18.7	22.7	15.0	12.6	14.2
Cost-income ratio (p.c.)	68.1	64.5	69.3	71.5	72.9	73.2	72.8
Average yield on assets (p.c.)	5.8	5.6	5.7	5.9	5.8	5.0	4.0
Average cost of funding (p.c.)	4.5	4.3	4.3	4.7	4.5	3.5	2.6
Interest margin (p.c.)	1.3	1.3	1.4	1.3	1.4	1.5	1.4
B. Total of Belgian credit institutions							
Balance sheet total (billions of euro)	813.7	854.6	926.7	971.3	1,063.7	1,024.6	1,033.0
Customers' holdings (billions of euro)	403.1	444.2	477.4	504.2	545.0	535.3	531.9
Loans and advances to customers (billions of euro)	265.4	303.8	342.9	392.7	416.3	421.3	428.8
Off-balance-sheet forward operations (billions of euro)	2,107.2	2,116.3	2,507.2	2,611.5	3,237.5	4,297.7	4,625.7
Assets and deposits in trust (billions of euro)	2,715.8	3,063.3	4,197.2	5,429.7	9,478.0	12,020.3	12,881.5
Risk asset ratio (p.c.)[2]	11.5	11.3	11.9	11.9	12.9	13.1	12.8
Net after tax results (billions of euro)	2.1	2.6	3.7	5.5	3.8	3.2	4.0
Return on average assets (p.c.)	0.3	0.3	0.4	0.6	0.4	0.4	0.4
Return on average equity (p.c.)[2]	12.0	11.0	17.1	20.4	13.7	11.8	13.6
Cost-income ratio (p.c.)	69.2	65.8	69.9	72.2	74.1	74.7	73.9
Average yield on assets (p.c.)	5.7	5.6	5.6	5.9	5.8	4.9	4.0
Average cost of funding (p.c.)	4.5	4.4	4.2	4.6	4.4	3.4	2.6
Interest margin (p.c.)	1.2	1.3	1.4	1.3	1.4	1.5	1.4

Source : BFIC.

(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)

	1997	1998	1999	2000	2001	2002	2003
Assets							
Interbank assets	253.2	232.6	222.5	198.4	219.9	214.8	206.1
Loans and advances to customers	265.4	303.8	342.9	392.7	416.3	421.3	428.8
Securities and other negotiable instruments	248.8	264.6	294.9	296.5	316.9	291.6	301.0
Fixed assets	10.5	12.0	14.1	15.8	18.8	18.2	17.5
Other	35.8	41.7	52.4	68.0	91.8	78.6	79.7
Liabilities							
Interbank liabilities	303.1	289.6	304.9	286.8	284.8	254.9	257.3
Customers' holdings	403.1	444.2	477.4	504.2	545.0	535.3	531.9
– deposits	279.7	327.1	350.7	369.0	411.8	406.6	416.7
– bank bonds and other debt securities	123.4	117.1	126.7	135.3	133.2	128.8	115.2
Subordinated debts	14.8	16.8	20.4	24.0	27.5	25.8	23.9
Own funds	19.8	22.7	23.1	26.9	28.9	30.5	32.2
Other	73.0	81.4	100.9	129.4	177.5	178.0	187.7
Balance sheet total	**813.7**	**854.6**	**926.7**	**971.3**	**1,063.7**	**1,024.6**	**1,033.0**

Source : BFIC.

(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)

	1997	1998	1999	2000	2001	2002	2003
Liabilities with an original maturity of more than one year							
Term deposits	9.5	9.5	10.3	10.5	11.2	10.5	11.4
Bank bonds	72.9	65.4	60.0	57.5	53.0	51.9	44.3
Other customers' holdings (2)	7.7	8.8	8.7	5.6	5.2	4.8	6.4
Sub-total	*90.1*	*83.6*	*79.0*	*73.5*	*69.4*	*67.3*	*62.1*
Liabilities with an original maturity of up to one year							
Saving deposits	89.0	93.7	98.4	92.5	98.5	110.5	129.0
Sight deposits	40.2	48.0	52.9	57.0	60.1	61.9	68.0
Deposits with a term							
of up to one month	20.6	20.6	20.1	18.2	21.9	22.5	19.8
of more than one month up to one year	21.9	24.8	28.8	30.4	33.3	29.8	28.1
Bank bonds with a term of one year	2.1	1.6	1.5	1.5	1.9	1.0	0.7
Other customers' holdings (2)	5.2	5.6	8.2	10.6	7.8	8.1	9.7
Sub-total	*179.0*	*194.2*	*209.9*	*210.3*	*223.6*	*233.9*	*255.3*
Total liabilities collected in Belgium	**269.1**	**277.9**	**288.8**	**283.8**	**293.0**	**301.2**	**317.4**

Source : BFIC.

(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)

	1997	1998	1999	2000	2001	2002	2003
Installment loans	9.9	12.0	13.4	13.7	13.9	14.3	13.5
Mortgage loans[2]	52.0	63.1	74.4	79.5	85.0	93.6	117.4
Term loans	147.3	162.7	182.4	209.7	233.0	242.2	230.1
Current account advances	23.4	32.4	35.7	40.6	36.4	34.0	29.6
Trade bills and acceptance credits	27.8	27.8	29.2	38.2	34.5	26.5	24.8
Other	4.8	5.8	7.9	11.0	13.5	10.7	13.4
Total	**265.4**	**303.8**	**342.9**	**392.7**	**416.3**	**421.3**	**428.8**
of which on Belgium	**184.1**	**192.6**	**209.1**	**218.0**	**220.5**	**219.3**	**224.3**
of which on foreign countries	**81.2**	**111.2**	**133.7**	**174.7**	**195.8**	**201.9**	**204.5**

Source : BFIC.

(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)

	1997	1998	1999	2000	2001	2002	2003
Total investment portfolio	**225**	**243**	**268**	**254**	**265**	**239**	**237**
Government securities portfolio	*162*	*168*	*175*	*154*	*168*	*149*	*156*
Long-term Belgian government securities	107	111	101	86	76	67	64
Short-term Belgian government securities	19	20	11	7	7	8	4
Long-term foreign government securities	35	34	48	54	79	72	86
Short-term foreign government securities	1	2	15	7	6	3	2
Securities of credit institutions	*29*	*29*	*43*	*44*	*41*	*34*	*34*
Securities of other companies	*31*	*42*	*45*	*49*	*50*	*50*	*43*
Non-interest-bearing securities	*3*	*4*	*5*	*6*	*6*	*5*	*3*
Total trading portfolio	**24**	**22**	**27**	**43**	**52**	**52**	**64**
Government securities portfolio	*17*	*13*	*16*	*21*	*23*	*23*	*23*
Long-term Belgian government securities	6	6	5	5	4	5	5
Short-term Belgian government securities	4	2	4	5	4	3	3
Long-term foreign government securities	7	4	6	11	14	11	12
Short-term foreign government securities	0	0	0	1	2	3	2
Securities of credit institutions	*3*	*2*	*2*	*2*	*6*	*8*	*11*
Securities of other companies	*2*	*3*	*4*	*8*	*10*	*13*	*14*
Non-interest-bearing securities	*1*	*3*	*6*	*11*	*12*	*8*	*15*
Total portfolio	**249**	**265**	**295**	**296**	**317**	**291**	**301**

Source : BFIC.

(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)

	1997	1998	1999	2000	2001	2002	2003
Foreign exchange							
Forward exchange operations	598	536	328	268	266	297	311
Currency futures	0	1	1	1	1	0	0
Forward exchange rate contracts	1	12	0	0	3	6	9
Interest and currency swaps	48	46	47	51	57	61	58
Currency options	35	31	26	38	41	69	91
Sub-total	*682*	*626*	*402*	*358*	*368*	*432*	*468*
Interest rates							
Interest rate contracts	290	170	230	134	131	268	194
Interest rate futures	77	71	76	52	74	86	82
Deposit contracts	10	5	2	3	5	1	5
Interest rate swaps	951	1,010	1,525	1,507	1,880	2,528	2,742
Interest rate options	65	120	174	375	550	743	889
Sub-total	*1,393*	*1,376*	*2,006*	*2,071*	*2,640*	*3,627*	*3,912*
Others							
Other forward contracts, futures and swaps	10	55	25	25	29	23	22
Other options	22	60	73	157	200	215	223
Sub-total	*31*	*114*	*98*	*181*	*229*	*238*	*245*
Total	**2,107**	**2,116**	**2,507**	**2,611**	**3,237**	**4,297**	**4,625**

Source : BFIC.

(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)

	1997	1998	1999	2000	2001	2002	2003
Own funds sensu stricto ("tier 1 capital")[1]	21.55	25.73	28.62	30.62	33.20	34.20	34.30
of which hybrid instruments	0.00	0.00	1.69	1.69	2.75	2.70	2.40
Additional items of own funds for credit and market risks ("tier 2 capital")	12.12	13.70	18.14	20.83	22.32	20.50	18.40
of which upper tier 2[2]	4.35	3.70	6.29	6.98	7.20	5.90	5.40
of which lower tier 2[3]	7.82	9.97	11.85	13.86	15.12	14.60	12.90
Deduction of participations	–1.84	–1.58	–2.73	–3.80	–3.94	–3.70	–3.90
Total	*31.83*	*37.85*	*44.03*	*47.66*	*51.58*	*50.90*	*48.80*
Additional items of own funds for market risks only ("tier 3 capital")[4]	0.77	0.99	1.04	1.64	2.56	1.90	2.10
Risk asset ratio (p.c.)	**11.5**	**11.3**	**11.9**	**11.9**	**12.9**	**13.1**	**12.8**

Source : BFIC.

(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 portfolios' 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)

	1997	1998	1999	2000	2001	2002	2003
Net interest income	9.61	10.31	11.40	11.73	12.26	12.67	12.17
Investment income other than net interest income[2]	2.43	3.50	2.97	3.30	3.52	2.73	2.44
Other income[3]	4.35	5.58	7.73	10.44	10.01	9.19	8.23
Banking income	16.38	19.39	22.10	25.47	25.79	24.59	22.84
Operating expenses (–)[4]	11.33	12.76	15.46	18.38	19.09	18.36	16.89
(of which personnel expenses)	(5.57)	(5.95)	(6.88)	(7.68)	(8.17)	(8.13)	(7.68)
Gross operating results	5.05	6.63	6.64	7.09	6.70	6.24	5.95
Value adjustments (–)	2.11	2.29	1.67	1.51	1.57	2.17	1.49
Exceptional results	0.45	–0.18	0.06	1.97	0.15	0.54	0.49
Income taxes and transfers (–)	1.24	1.43	1.24	1.98	1.47	1.07	1.12
Portion of the result of undertakings included in the consolidated accounts according to the equity method	0.11	0.05	0.19	0.38	0.34	0.01	0.32
Third-party interest in the result of consolidated subsidiaries (–)	0.15	0.22	0.30	0.40	0.38	0.35	0.16
Consolidated results[5]	**2.11**	**2.56**	**3.68**	**5.55**	**3.77**	**3.19**	**3.98**

Source : BFIC.

(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

	1997	1998	1999	2000	2001	2002	2003
A. By the location of their registered office							
Belgium (1)	153	150	137	130	125	123	118
European Economic Area (2)	81	77	79	73	71	73	66
Rest of the world (3)	8	7	6	6	6	6	5
Total	**242**	**234**	**222**	**209**	**202**	**202**	**189**
Free service provision (4)	470	525	556	589	613	629	670
B. By specialisation (5)							
Life insurance	36	34	31	29	28	30	31
Non-life insurance	165	160	154	145	140	140	127
Life and non-life insurance	41	40	37	35	34	32	31
Total	**242**	**234**	**222**	**209**	**202**	**202**	**189**

Source : BFIC.
(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)

	1997	1998	1999	2000	2001	2002
Investments	65.2	75.0	86.0	94.9	103.8	110.3
All activities with the exception of branch 23	*64.0*	*71.8*	*77.5*	*81.7*	*87.3*	*94.6*
Shares (2)	8.4	11.8	13.9	15.7	18.1	15.8
Debt securities	38.2	43.1	48.8	51.1	53.6	58.9
Land and buildings	2.3	2.3	2.0	1.9	2.0	2.4
Mortgage loans	5.5	5.3	5.0	5.0	5.3	5.9
Investments in affiliated undertakings	6.1	6.5	4.8	4.9	5.1	7.4
Others	3.5	2.8	2.9	3.1	3.2	4.2
Branch 23	*1.2*	*3.2*	*8.5*	*13.2*	*16.4*	*15.8*
Shares (2)	0.7	2.3	7.5	11.9	14.5	13.1
Debt securities	0.4	0.6	0.6	1.0	1.5	2.1
Others	0.1	0.3	0.4	0.3	0.4	0.6
Reinsured part of technical provisions	4.0	4.1	4.5	4.8	5.6	6.0
Claims and other assets	7.0	7.5	8.3	8.6	9.0	9.8
Total	**76.2**	**86.6**	**98.8**	**108.3**	**118.4**	**126.1**

Source : BFIC.

(1) Insurance companies supervised by the BFIC.

(2) Including shares in UCIs.

TABLE 13 MAIN COMPONENTS OF BELGIAN INSURANCE COMPANIES' LIABILITIES[1]

(Data on a company basis, billions of euro)

	1997	1998	1999	2000	2001	2002
Own funds	8.0	8.5	7.5	8.1	8.6	7.9
Technical provisions	61.3	69.1	81.5	89.9	99.4	107.8
Life insurance (with the exception of branch 23)	39.5	44.7	50.3	52.5	57.0	64.8
Branch 23	1.2	3.2	8.5	13.2	16.6	16.0
Non-life insurance	16.8	17.4	18.7	20.1	21.4	22.4
Others	3.9	3.8	3.9	4.1	4.4	4.6
Reinsurance companies' deposits	2.0	2.1	2.0	2.0	2.3	2.3
Creditors' claims	4.0	5.7	6.3	6.9	6.7	6.9
Other liabilities	0.8	1.2	1.5	1.4	1.3	1.2
Total	**76.2**	**86.6**	**98.8**	**108.3**	**118.4**	**126.1**

Source : BFIC.

(1) Insurance companies supervised by the BFIC.

TABLE 14 COMPONENTS OF THE INCOME STATEMENT OF BELGIAN INSURANCE COMPANIES[1]

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

	1997	1998	1999	2000	2001	2002
A. Technical account in life insurance						
Net premiums written	6.2	8.2	10.0	12.8	13.1	14.4
Claims paid (–)	3.4	3.8	4.3	4.8	5.4	6.9
Change in the provisions for claims (–)	4.5	7.2	8.3	9.1	7.8	6.4
Premiums after insurance costs	**–1.7**	**–2.8**	**–2.7**	**–1.1**	**–0.1**	**1.2**
Net operating expenses (–)	0.8	0.9	1.0	1.0	1.1	1.1
Result before investment income	**–2.5**	**–3.6**	**–3.7**	**–2.2**	**–1.2**	**0.0**
Net investment income	3.1	4.7	4.8	3.2	2.0	–0.3
Technical result life insurance	**0.7**	**1.1**	**1.2**	**1.0**	**0.8**	**–0.2**
B. Technical account in non-life insurance						
Net premiums written	6.5	6.7	7.0	7.3	7.8	8.5
Claims paid (–)	4.4	4.6	5.0	5.3	5.8	5.9
Change in the provisions for claims (–)	1.0	0.7	0.7	0.6	0.9	0.9
Premiums after insurance costs	**1.1**	**1.4**	**1.3**	**1.4**	**1.2**	**1.7**
Net operating expenses (–)	2.2	2.3	2.4	2.3	2.5	2.7
Result before investment income	**–1.1**	**–0.9**	**–1.1**	**–0.9**	**–1.4**	**–1.0**
Net investment income	1.6	1.7	1.9	1.5	1.4	0.7
Technical result non-life insurance	**0.5**	**0.9**	**0.8**	**0.6**	**0.0**	**–0.3**
C. Non-technical account						
Total technical result life and non-life insurance	1.2	2.0	2.0	1.6	0.8	–0.5
Residual net investment income	0.6	1.8	0.6	0.5	0.6	0.1
Other and exceptional results and taxes	–0.1	–0.9	–0.5	–0.3	–0.4	–0.4
Net result	**1.6**	**2.9**	**2.0**	**1.7**	**1.0**	**–0.8**
p.m. Return on equity (in p.c.)	*20.1*	*34.2*	*26.9*	*21.5*	*12.1*	*–10.4*

Source : BFIC.

(1) Insurance companies supervised by the BFIC.

TABLE 15 LEVEL AND COMPOSITION OF BELGIAN INSURANCE COMPANIES' AVAILABLE SOLVENCY MARGIN[1]

(Data on a company basis, millions of euro, unless otherwise stated)

	1997	1998	1999	2000	2001	2002	2003
Explicit margin	7,983	8,361	7,717	7,953	8,555	8,238	10,143
p.c. of required margin	*252*	*242*	*200*	*194*	*197*	*173*	*196*
Implicit margin	1,900	2,664	2,585	2,894	3,454	3,853	3,302
Share in future profits (life insurance)	969	933	1,423	1,667	1,968	1,855	1,408
Unrealised capital gains	931	1,731	1,162	1,227	1,486	1,998	1,894
p.c. of required margin	*60*	*77*	*67*	*71*	*79*	*81*	*64*
Total margin	9,884	11,025	10,302	10,847	12,008	12,091	13,445
p.c. of required margin	*312*	*319*	*267*	*265*	*276*	*254*	*260*

Source : BFIC.

(1) Insurance companies supervised by the BFIC.

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)

	1997	1998	1999	2000	2001	2002	2003
Bonds	53.4	52.5	49.9	48.4	48.1	50.0	52.8
Equity	20.7	25.0	27.3	25.8	24.1	14.6	12.7
Real estate	4.9	4.3	3.3	3.0	2.8	3.1	2.8
Loans	8.8	7.1	5.7	5.6	5.6	5.6	4.7
UCIs	1.1	1.5	4.5	8.0	10.2	15.6	15.6
Others	11.1	9.7	9.3	9.2	9.3	11.1	11.3
Total (billions of euro)	**61.0**	**70.0**	**83.7**	**87.9**	**98.0**	**110.5**	**127.6**

Source : BFIC.

(1) Assets allocated to a specific insurance activity as a cover for the provisions resulting from that activity. Covering assets are valued at "affectation 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 BFIC.

TABLE 17 KEY FIGURES OF STOCKBROKING FIRMS

(Data on a company basis)

	1997	1998	1999	2000	2001	2002	2003
Number of companies	57	52	49	46	43	40	37
of which with a majority of institutional shareholders	10	9	10	12	11	12	10
Securities portfolio for own account (billions of euro) (1) (3)	1.10	1.21	7.61	7.71	10.95	12.00	18.60
– equity	0.49	0.65	1.91	2.47	1.96	1.67	3.42
– debt securities	0.47	0.40	0.28	0.46	1.55	1.80	1.79
– other financial instruments (2)	0.14	0.16	5.42	4.78	7.44	8.53	13.39
Balance sheet total (billions of euro) (3)	2.35	2.73	6.59	6.94	9.71	9.88	15.48
Deposits in trust (billions of euro) (4)	0.56	0.82	0.99	1.16	1.17	0.90	0.71
Securities in trust (billions of euro)	8.04	10.00	15.53	16.15	20.70	19.73	32.79
Regulatory own funds (billions of euro)	0.15	0.17	0.34	0.45	0.38	0.33	0.23
Risk asset ratio (p.c.)	20.20	24.30	20.80	31.40	22.00	17.70	16.20
Income (billions of euro) (3)	0.26	0.33	0.50	0.50	0.28	0.34	0.31
– fees and commissions	0.15	0.18	0.18	0.23	0.12	0.10	0.09
– on trading for own account	0.07	0.09	0.26	0.23	0.11	0.19	0.15
Operating expenses (billions of euro) (3)	0.17	0.19	0.21	0.27	0.29	0.35	0.32
Net after tax results (billions of euro) (3)	0.09	0.12	0.28	0.23	0.02	0.00	0.02
Return on average equity (p.c.) (5)	49.10	60.80	58.60	31.80	2.90	0.60	2.70

Source : BFIC.

(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)

	1997	1998	1999	2000	2001	2002	2003
Number of companies	16	23	27	31	34	33	30
of which with a majority of institutional shareholders	3	8	10	13	17	16	15
Assets under management (billions of euro)	15.64	58.36	99.64	174.09	144.19	135.63	183.27
Balance sheet total (billions of euro)	0.02	0.08	0.37	0.66	0.67	0.77	1.08
Own funds (billions of euro)	0.01	0.03	0.25	0.40	0.42	0.43	0.65
Income (billions of euro)	0.01	0.07	0.20	0.50	0.55	0.58	0.77
Operating expenses (billions of euro)	0.01	0.04	0.11	0.33	0.37	0.27	0.48
Net after tax results (billions of euro)	0.00	0.02	0.05	0.12	0.13	0.22	0.21
Return on average equity (p.c.)	38.90	79.10	21.50	30.00	31.50	50.20	32.90

Source : BFIC.

TABLE 19 GROSS PUBLIC ISSUES OF SECURITIES IN BELGIUM

(Billions of euro)

	1997	1998	1999	2000	2001	2002	2003
1. Shares							
Belgian companies	1.58	1.05	2.01	7.03	0.19	0.35	0.35
Foreign companies	0.02	0.10	0.17	0.78	0.06	0.12	0.03
Total	*1.60*	*1.15*	*2.18*	*7.81*	*0.25*	*0.47*	*0.38*
2. Fixed income securities							
2.1 Bonds	*1.30*	*1.66*	*2.49*	*0.18*	*0.06*	*0.38*	*1.23*
Belgian companies	0.94	0.66	0.28	0.11	0.00	0.01	0.05
Foreign companies	0.35	1.00	2.21	0.07	0.06	0.37	1.18
2.2 Fixed income securities with capital at risk (1)	*n.a.*	*n.a.*	*n.a.*	*3.19*	*1.34*	*1.50*	*0.34*
Belgian companies	n.a.	n.a.	n.a.	0.14	0.11	0.00	0.00
Foreign companies	n.a.	n.a.	n.a.	3.06	1.23	1.50	0.34
2.3 Total	*1.30*	*1.66*	*2.49*	*3.38*	*1.40*	*1.88*	*1.57*
3. Subordinated debt issued by credit institutions	**0.92**	**0.57**	**2.20**	**1.79**	**1.16**	**0.05**	**0.66**
4. Government debt							
4.1 Linear bonds (OLOs)	17.00	23.30	28.30	32.10	26.00	26.10	23.30
4.2 Other bonds and notes	1.18	1.59	1.05	1.22	1.04	1.30	1.30
4.3 Treasury certificates (2)	0.55	–5.83	–6.81	–3.48	1.38	0.06	–0.84

Sources : Belgian Debt Agency, BFIC, 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.

TABLE 20 BELGIAN UNDERTAKINGS FOR COLLECTIVE INVESTMENT

	1997	1998	1999	2000	2001	2002	2003
A. Number per legal form (end of period)							
Investment companies	79	90	96	103	108	108	105
Number of compartments	*636*	*1,139*	*1,499*	*1,851*	*1,951*	*1,987*	*1,252* (5)
Investment funds	6	12	12	14	16	16	16
Pension savings funds (1)	13	12	12	11	10	10	11
Real estate UCIs (2)	3	8	13	13	12	11	11
Undertakings for investment in receivables (3)	7	9	9	9	9	10	10
Venture capital UCIs (4)		1	1	1	2	2	2
Total	**108**	**132**	**143**	**151**	**157**	**157**	**155**
B. Assets (billions of euro)							
1. Net asset value end of preceding year	23.42	33.13	51.80	70.34	83.51	88.32	78.26
2. Subscriptions	12.05	19.92	24.28	33.65	26.43	18.31	20.32
3. Redemptions	6.66	8.45	11.34	16.58	14.53	14.87	16.86
4. Net amounts invested (4 = 2 – 3)	**5.38**	**11.47**	**12.94**	**17.08**	**11.90**	**3.44**	**3.47**
5. Costs	0.37	0.55	0.73	1.08	1.06	0.99	0.99
6. Capital gains or losses	4.70	7.76	6.32	–2.82	–6.03	–12.51	4.31
7. Net asset value end of period (7 = 1 + 4 – 5 + 6)	**33.13**	**51.80**	**70.34**	**83.51**	**88.32**	**78.26**	**85.05**

Source : BFIC.

(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

	1997	1998	1999	2000	2001	2002	2003
A. Number of undertakings (end of period)							
per legal form							
Investment companies	165	177	178	188	198	194	197
Number of compartments	*1,254*	*1,487*	*1,721*	*1,901*	*2,029*	*2,036*	*2,067*
Investment funds	67	73	79	76	76	70	70
Total	**232**	**250**	**257**	**264**	**274**	**264**	**267**
per category							
Undertakings with UCIT-passport	188	206	219	227	239	230	218
Number of compartments	*1,036*	*1,282*	*1,530*	*1,732*	*1,880*	*1,891*	*1,925*
Undertakings without UCIT-passport	44	44	38	37	35	34	49
Number of compartments	*218*	*205*	*191*	*169*	*149*	*145*	*142*
Total	**232**	**250**	**257**	**264**	**274**	**264**	**267**
B. Net amounts invested (billions of euro)							
Subscriptions in Belgium							
Investment companies	9.05	10.69	12.95	14.46	9.88	12.08	12.14
Investment funds	0.16	0.11	0.19	0.12	0.05	0.32	0.03
Total	**9.21**	**10.80**	**13.14**	**14.57**	**9.92**	**12.39**	**12.17**
Redemptions in Belgium							
Investment companies	7.25	9.15	9.66	15.34	10.70	11.41	11.89
Investment funds	0.12	0.09	0.11	0.11	0.04	0.17	0.05
Total	**7.37**	**9.24**	**9.78**	**15.45**	**10.73**	**11.58**	**11.94**
Net amounts invested in Belgium							
Investment companies	1.81	1.54	3.29	–0.88	–0.82	0.67	0.26
Investment funds	0.04	0.02	0.07	0.01	0.01	0.14	–0.02
Total	**1.85**	**1.56**	**3.36**	**–0.88**	**–0.81**	**0.81**	**0.24**

Source : BFIC.

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

(Billions of euro)

	1997	1998	1999	2000	2001	2002	2003
Bonds	27.50	30.63	30.25	29.88	32.83	31.22	31.73
Medium term investments	1.83	1.41	1.34	1.04	1.44	1.75	1.89
Monetary investments	6.15	4.86	4.56	3.80	5.03	6.29	5.71
Equity	10.44	18.55	31.98	40.26	37.36	24.71	26.72
Index with capital protection	9.95	19.77	27.01	27.63	29.20	31.77	35.90
Mixed	7.33	12.30	17.76	24.65	27.00	21.95	22.85
Pension savings funds	5.81	7.98	7.95	7.68	7.41	6.40	7.42
Real estate	1.17	2.35	3.14	3.05	3.27	3.39	3.85
Venture capital	0.00	0.06	0.05	0.13	0.13	0.07	0.08
Miscellaneous	0.01	0.03	0.04	0.10	0.03	0.02	0.02
Total	**70.19**	**97.94**	**124.08**	**138.22**	**143.70**	**127.57**	**136.17**

Source : BEAMA.

Thematic Articles

Corporate governance, regulation and supervision of banks

Johan Devriese, Mathias Dewatripont, Dirk Heremans and Grégory Nguyen

1. Introduction

Ever since firms grew large and became funded by a variety of investors, they have had to deal with the separation of ownership and control and the associated agency problems. Various corporate governance arrangements try to limit these problems as efficiently as possible. Recently, corporate crises such as Enron and Worldcom in the US and Parmalat in Italy moved the corporate governance debate to the forefront of public policy on both sides of the Atlantic. (1)

Most of the corporate governance debate has emphasised the governance of non-financial corporations, while little attention has been paid to the corporate governance of banks. Yet, corporate governance of banks differs from that of non-financial firms. In banks, debt holders are dispersed and non-experts, which limits the effectiveness of debt governance arrangements traditional in non-financial firms. In addition, the high proportion of debts in the total liabilities, and the resulting high leverage, facilitate risk shifting by shareholders. Hence there is a need for a representative of depositors to "mimic" the role taken by debt holders in non-financial firms. Typically, this role will be performed by a regulatory and supervisory authority (hereafter called the "RSA").

The stance taken in this paper goes beyond the usual efficiency concern that underpins the corporate governance debate. Instead, we take a banking stability perspective. In particular, we stress that managers may be more risk averse than shareholders. Hence, it may be in the interest of the RSA to put more power in the hands of management vis-à-vis the shareholders. This is in contrast to traditional corporate governance recommendations for non-financial firms. In some countries, managerial control is legally possible through structures such as trusts. However, in others it is associated with dispersed shareholder structures. Here, however, another concern may be the stability of shareholders when share ownership is dispersed. In this case, it may be difficult to oblige shareholders to bail-in (2) ailing banks in the event of under-capitalisation. This raises some trade-offs between various shareholder structures and the relative power of managers vis-à-vis shareholders. In particular, shareholder structure, management incentives and the structure of the board of directors are evaluated with respect to their impact on a bank's risk.

The Belgian supervisory model tries to balance the respective power of shareholders and management by introducing the agreement on the autonomy of bank management. (3) This agreement tries to combine the presence of strong reference shareholders with independent bank management. Initially, in 1959, it was meant to avoid shareholders' intervention in the credit policy of the bank (the risk of this kind of intervention was especially present in banks owned by an industrial holding company). The agreement was revised in 1992 to take account of a changing banking environment. However, the banking sector is still evolving. Capital markets and financial regulation are becoming more and more internationally oriented, and so are shareholders. The presence of industrial holding companies in the Belgian banking landscape is tending to decrease. On the other hand, we observe an increase in financial conglomerates.

(1) See Shleifer and Vishny (1997) and Becht et al. (2004) for surveys of the academic literature on corporate governance.

(2) We refer to a bail-in as a situation in which shareholders have to provide additional capital to the bank in case of problems and to a bail-out as a situation in which the bank is recapitalised by an external party (e.g. the state, the regulators, etc.)

(3) Protocole d'autonomie de la fonction bancaire/Overeenkomst over de autonomie in de bankfunctie.

In parallel with these evolutions, banks have also modified their governance structures over time. These modifications are to be seen as a response to pressures brought by the market to adapt to international standards and best practices. These observations raise several interesting questions. Is there still a need for an autonomy agreement? Is the agreement still optimal in the light of the recent developments in the banking landscape? Does it overlap with or contradict EU and national law? Is it still manageable in a changing environment where foreign shareholders predominate? These questions are very complex, as corporate governance mechanisms result from a subtle equilibrium. The goal of this paper is to present a framework which allows for the conceptualisation of these issues. Therefore, the paper will provide an answer to some of these questions although others will remain unresolved.

The paper is structured as follows. Section 2 presents the theory on corporate governance in banking. Departing from the general framework for non-financial organisations, it discusses why agency conflicts in banks are different and what the implications are for financial regulation. Section 3 analyses how the appropriate corporate governance structure can help to solve these agency conflicts. Shareholder structure, management incentives and the structure of the board of directors are evaluated with respect to their impact on a bank's risk. In addition, several boxes in Section 3 present evidence on the governance of Belgian banks at the end of 2003.[4] Section 4 discusses and analyses the agreement on the autonomy of bank management in the light of Sections 2 and 3. Section 5 concludes.

(4) Bank governance is constantly evolving and some banks have announced their intention to change their governance structure. Therefore, as the evidence that is presented reflects the situation at the end of 2003, it may no longer be accurate at the time of publication.

2. Corporate governance and banking: theory

2.1 Corporate governance in general

The general "corporate finance" problem facing business undertakings is the one of raising finance efficiently. This means raising finance in a way that limits the *agency problems* arising from the separation between ownership and control. This separation, stressed originally by Berle and Means (1932), leads to classical problems identified for example in Jensen and Meckling (1976). For instance, when outside finance is needed, management efforts partly serve to repay outside investors. Thus, managers earn less than the full return on their effort, so that their incentive to exert effort is low. In a competitive capital market, managers end up bearing the cost of this distorted effort. Therefore, it is in both parties' interest to set up *governance mechanisms* that limit agency distortions.

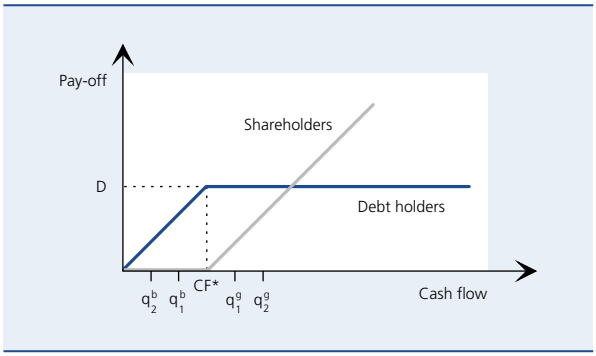
Governance mechanisms are associated with the different liabilities issued by the firm. They can be thought of as bundles of income rights as well as rights of control over the firm. In the real world, two standard liabilities are prevalent, with a variety of specific features in both cases: debt and equity. Debt implies a payment that is concave in the profit of the firm, and control of the firm is only given to debt holders in the case of lack of repayment (i.e. in "bad times"). The presence of debt leads to the possibility of excessive risk taking if management favours the interest of shareholders. Indeed, equity implies a payment that is convex in the profit of the firm; equity benefits from formal control (in the case of voting equity) unless debt is not repaid. This is explained in more detail in Box 1.

Box 1 – Risk Shifting

Figure 1.1 presents the pay-off of shareholders and debt holders under different outcomes of cash flow (CF) for a leveraged firm. There are two states of the world, i.e. b (bad, or bankruptcy) and g (good, or continuity), each with probability 0.5. As long as CF < CF* (bad state), there is not enough cash flow to repay all debt obligations D, hence the firm goes bankrupt and debt holders are in control. They receive CF. Shareholders receive nothing. From the moment CF ≥ CF* (good state), the firm can repay its debt. Debt holders receive D, shareholders receive CF-D.

Now suppose the manager of the firm is also the owner or acts in the owner's interest and has to choose between two projects, 1 and 2. The CF of each project depends on the state of the world and equals q_j^i (i = 1,2 and j = b, g). Both projects have the same Net Present Value (NPV), i.e. $0.5q_1^g + 0.5q_1^b = 0.5q_2^g + 0.5q_2^b$ However, $q_1^g < q_2^g$ and $q_1^b > q_2^b$ This means that $q_1^g - q_1^b < q_2^g - q_2^b$, implying that project 2 is riskier than project 1. Now look at the

FIGURE 1.1 PAY-OFF OF SHAREHOLDERS AND DEBT HOLDERS



pay-off of the two projects. The expected cash flow of the shareholder amounts to 0.5 $[q_1^g - D]$ if project 1 is chosen and 0.5 $[q_2^g - D]$ if project 2 is chosen. The debt holders' expected cash flow equals 0.5 $[q_1^b + D]$ for project 1 and 0.5 $[q_2^b + D]$ for project 2.

Hence, shareholders will prefer the riskier project 2, while debt holders prefer the less risky project 1. As the NPV corrected for risk is higher for project 1, project 1 is optimal for the firm. However, as shareholders are in command when choosing the project, project 2 will be the outcome. They engage in risk shifting.

The widespread coexistence between debt and equity can be rationalised if the "course of action" that management dislikes (e.g. restructuring) implies a reduction in the riskiness of firm profit (e.g. scaling down or closing some activities). Then, in order to give managers incentives, it is optimal to put in charge an investor who is risk averse in bad times (or risk loving in good times) (Dewatripont and Tirole, 1994a). However, for this scheme to work, one needs investors with *real control* and not just *formal control*.[5] Here, we have to distinguish managers from investors as a whole, as well as the number of investors.

In Continental Europe, as far as debt governance is concerned, bank lending remains the cornerstone in financing most non-financial companies. In this case, debt is in the hands of a few specialised debt holders, and formal control in fact means real control. Therefore, the extent of control depends essentially on the *bankruptcy regime*. In the United States, this regime is widely considered as manager- or debtor-friendly, by allowing firms in financial distress ample opportunities to limit or delay creditor involvement.[6] In contrast, in the United Kingdom the bankruptcy regime is creditor-friendly, with Belgium closer to the UK model.[7] In "bad times", concentrated debt holders then have both the power and the incentives to protect their interest.

As far as equity governance is concerned, formal control is guaranteed by corporate law. This may operate directly through shareholder democracy or indirectly through the Board of Directors as the monitor of management. Real shareholder control depends, however, on the degree of shareholder dispersion (Barca and Becht, 2001; Franks and Mayer, 1994; and La Porta et al., 1998). The US and the UK typically have high shareholder dispersion, and therefore low incentives for individual shareholders to exert control. The main debate is thus *how to curb excessive managerial power*. In contrast, in Continental Europe, there is often the prevalence of big block-holders that have an incentive to monitor managers better but *may abuse small shareholders*. These two problems have to be kept in mind when analysing the features of equity governance, such as board composition (and in particular the notion of "independent director"), manager remuneration and appointment or dismissal, takeover rules, general voting rules at shareholder meetings, and so on.

(5) To follow the terminology of Aghion and Tirole (1997), who distinguish the *right* to take decisions (formal control) from the *ability* to take decisions (real control), which typically requires prior information acquisition about the consequences of potential decisions. See also Burkart et al. (1997), who use the Aghion-Tirole framework to argue that shareholder dispersion reduces shareholder incentives to acquire information and therefore to exercise real control.

(6) Through the "Chapter 11" procedure.

(7) One could see the recent introduction of the *concordat* regime in Belgium as an attempt to become somewhat more manager/debtor-friendly.

2.2 Corporate governance and banking[8]

What is special about banks that justifies they are regulated differently from other firms? First, "systemic risk" in case of failure is often invoked to justify regulation. Note that the same argument may hold in other strategic industries or in cases where failure of a big firm has important repercussions on an entire region because of cascade effects on suppliers, creditors and even small and medium-sized firms that do a substantial share of their business with the laid-off employees of the failing firm. Strategic industries (such as the electricity sector, for instance) are often regulated as well. Yet this is not necessarily the case for big firms whose failure could cause cascade effects. Therefore, systemic risk per se does not fully separate banks from these big firms. One could, however, argue that the nature of financial systems makes the occurrence of contagion effects more likely and the macro-economic consequences more widespread (for instance, interbank linkages and payment systems are natural channels for contagion).

A second element concerns the high leverage of banks. A higher percentage of debt used in the capital structure implies a higher possibility of risk shifting and debt overhang.

A third key specificity of financial institutions concerns their governance, because of the nature of its *claim holders*. In *non-financial companies*, debt holders are often banks themselves, which have the necessary expertise and play an important role in disciplining management in the case of financial distress, e.g. in order to avoid "gambling for resurrection". By contrast, financial institutions have liabilities held by *dispersed non-experts*, namely depositors. In such cases, there is a need for a *debt holder representative*, which is a fundamental role for the RSA.[9] The same is true for insurance companies or pension funds, two sets of institutions whose regulation shares many similarities with banking regulation (see Dewatripont and Tirole, 1994b). Exiting, however, is easier for depositors than for policy holders. Therefore, we can expect that depositors exert discipline by voting with their feet, while insurance policy holders have an incentive to control ex-ante.

The need for a strong depositor representative is especially great the more the credit institution is allowed to take risks. Such risks are prevalent in banking since, beyond their essential role in payment systems, another banking function is to provide liquidity for individuals, through demand deposits. Avoiding systemic risk through self-fulfilling panics has required at least partial deposit insurance, which further reduces depositors' incentives to become expert in assessing the risks taken by their bank and creates moral hazard. This increases the need for regulation limiting the ability of shareholders to "play with the money of the deposit insurance fund".

There are several ways in which the RSA acts as debt holder representative.

First, by imposing several sets of constraints on financial institutions, which serve to ensure their solvency and to avoid systemic externalities. (i) Regulation of market structure may limit competition and hence increase charter value and improve stability. (ii) Prudential regulation sets limits on the structure of financial institutions' liabilities, in the form of "capital requirements" and limits on the riskiness of their asset portfolio. (iii) Additional "good practice" requirements aim at improving the governance of the financial institution. The paper mainly focuses on this last element. Second, ex-post, by threatening a "get-tough-policy" when these are not respected, with the RSA taking control and possibly closing or selling the financial institution. This broadly mimics the role of debt as a contingent control arrangement in non-financial firms, where control over the firm switches to creditors in bad times.

3. Bank Governance structures: implications for risk management and stability

Financial regulators increasingly acknowledge the importance of corporate governance. While Basel I determines capital requirements by defining capital weights for different categories of assets, Basel II allows some use of internal risk modelling techniques. This signals a partial move from a "regulatory" to a more "supervisory" approach by the RSA.[10] In turn, the RSA needs to rely more on the supervision of the procedures having an impact on these internal models. The organisation of these procedures relies heavily on the specifics of the corporate governance of banks.

The need to focus on the corporate governance of banks is also partly the result of the gradual elimination of activity restrictions, limiting the scope of banking activities. While the 1930's had seen the widespread introduction

(8) For details, see Dewatripont and Tirole (1994b) and Heremans (2000).

(9) While these regulators are civil servants, "private representatives" would be possible, in the same way that dispersed shareholders have representatives through the Board of Directors.

(10) A regulatory approach focuses primarily on the assessment of the quality of the bank's balance sheet at a point in time, and then determines whether the bank complies with capital requirements and restrictions on asset holdings. A supervisory approach focuses more on the soundness of the bank's management practices with regard to controlling risk (Mishkin, 2000).

of activity restrictions as a way to limit the possibility of contagion in the banking sector, many of these have been lifted since the 1970's and the subsequent deregulation. In Belgium this has resulted in a banking landscape where most banking activities are conducted as part of "bancassurance" conglomerates. The complex nature of potential spill-overs between business lines then calls for the supervision of internal risk procedures as a complement to more "standard" banking regulation and also suggests strengthened co-operation between RSA in banking and insurance industries.

The problem facing the RSA can be summarised as follows: while modern banking regulation of the Basel I type is the natural counterpart to the debt-and-equity governance of non-financial firms, it is not foolproof in a world of deregulated banks and accounting lags. Limitations on the effectiveness of regulation imply that excessive risk taking by banks remains a real problem. Hence, the goal of banking supervision is to complement regulations to further limit excessive risk taking. The supervision of banks' corporate governance structures can be analysed in this light. This implies that particular emphasis should be placed on the risk attitudes of the parties exerting real control over banking decisions and how these attitudes and relative powers can be influenced (through financial incentives, through "bail-in" obligations, etc.).

We now turn to the impact of corporate governance structures, such as ownership structure, board composition and management incentives, on risk taking and stability of the banking sector. In doing this, we follow Berle and Means (1932), Jensen and Meckling (1976), Aghion and Bolton (1992) or Hart (1995a, b). They view organisational decisions as being determined by the power and the incentives of the different parties involved. Corporate governance structures influence these incentives and powers. Beyond this, we should remember that, in banks, apart from managers and shareholders, the party potentially in control is the debt holder representative, the RSA, rather than debt holders themselves. Moreover, another difference in relation to the stance taken in the literature on non-banking organisations is that we do not discuss the organisation of corporate governance structures from the point of view of profit maximisation. Rather, we perform the analysis from the RSA's point of view, that is, the enhancement of financial stability. This being said, we shall draw both from the literature of non-financial firms and from the (much smaller) literature devoted to banking organisations.

3.1 Risk attitudes and the control of corporations

As stressed in Section 2, in non-financial corporations, formal control lies with risk-loving shareholders in good times and with risk-averse debt holders in bad times. In the banking context, due to the high leverage and dispersed debt holders, there is a concern that shareholders may face greater risk taking incentives than shareholders of non-financial firms. Indeed, in the absence of regulatory intervention, given the high leverage and the dispersion of debt holders, shareholders benefit from a higher potential for risk-shifting and gambling for resurrection.

But what about managers, when they enjoy real control? One could argue that, in a typical firm, managers would be intrinsically more risk averse than shareholders, for two reasons. First, they stand to lose invested specific human capital and, in some cases, invested wealth if the bank goes bankrupt. A second reason concerns the possibility of diversifying. Managers tie up all their human capital in the firm, so their degree of diversification is limited. Hence, they care about the total risk of the firm, i.e. systematic and idiosyncratic risk. *Diversified shareholders* on the other hand only care about systematic risk. Therefore, they could intuitively tolerate more risk than managers would be willing to accept.

The above argument implicitly assumes the absence of an RSA and the existence of a fixed compensation scheme for managers. Things can change when managers start receiving performance-based pay. With regard to the cash flow effect, managers face a trade-off between future cash flows generated by specific human capital invested in the firm and additional cash flows generated by increased performance resulting from increased risk taking. When linked to share prices, managerial incentives become more aligned with those of shareholders, even though the above considerations imply that the manager may remain more risk averse than shareholders. Things can, however, be different when managers are paid with stock-options, whose value can be very sensitive to the volatility of the underlying stock. In fact, above a certain threshold of option-based pay, managers may receive more incentives to take risks than shareholders. This is especially the case when options have a high exercise value and are out of the money.

From the RSA's point of view, one can thus say that, except for very high-powered incentive schemes, managerial control should reduce excessive risk taking. This may no longer be true when option-based pay is very significant. This type of remuneration is more likely the more diversified shareholders are, because diversification

increases their tolerance to risk. Banking stability concerns therefore provide an argument for:

– favouring managerial control over shareholder control when managerial pay is not too sensitive to share prices;
– limiting option-based managerial compensation.[11]

In practice, several studies have found that regulatory frameworks influence the impact of both (i) managerial ownership and (ii) pay-performance scheme on risk taking and performance in banks.

Saunders, Strock and Travlos (1990) use a sample of 38 US bank holding companies over 1978-1985, a period of relative deregulation. They find that banks whose managers hold a relatively large portion of the shares exhibit a significantly higher risk taking behaviour. Anderson and Fraser (2000) use a panel of 150 US banks covering the period 1987-1994. They find that total and firm-specific risk are positively related to managerial ownership between 1987 and 1989. On the other hand, they also find that, after regulatory changes in 1989 and 1991 (which were designed to reduce risk taking and led to higher franchise values), bank risk was negatively related to managerial shareholdings (i.e. over 1992-1994). Systematic risk was unrelated to ownership in both periods. Lee (2002) uses a sample of 65 bank holding companies over the period 1987-1996 and finds that risk taking in banks where managers hold a large proportion of shares is more pronounced for banks with a relatively low probability of failure. This is in line with the diversification argument.

Houston and James (1995) use a sample of 134 banks covering the period 1980-1990. They find that, compared to CEOs in other industries, bank CEOs receive in absolute value less cash compensation (although their cash compensation is more sensitive to firm performance), are less likely to participate in a stock option plan, hold fewer stock options and receive a smaller percentage of their total compensation in the form of options and stock. They find no evidence that the total pay-performance sensitivity is higher in banking and no significant relation between the reliance on equity-based compensation and bank risk. They conclude that shareholders do not use CEO equity-based compensation to promote risk taking, but cannot rule out alternative mechanisms (e.g. cash-based compensation) as incentives for managers to increase risk taking. They attribute this to the fact that banks are regulated.

John and Qian (2003) use a sample of 123 banks over 1992-2000 and find that the pay-performance sensitivity of bank management seems to be lower than in other industries. They find that an increase of $ 1000 in shareholder value triggers an increase of $ 4.7 in the firm-related wealth of bank CEOs vs. $ 17.5 for non-bank CEOs (i.e. a statistically significant difference of $ 12.8). They attribute this result to the fact that the banking industry has high debt ratios and is regulated.

3.2 Equity governance

The real power of shareholders depends very much on its degree of dispersion. As long ago as 1932, Berle and Means called attention to the prevalence of widely held corporations in the US, in which ownership was dispersed among small shareholders, and real control was concentrated in the hands of managers. As stressed by Barca and Becht (2001), Franks and Mayer (1994) or La Porta et al. (1998), publicly-traded firms in Continental Europe are predominantly controlled by "block-holders". This shifts the corporate governance debate away from a shareholder-manager conflict, as controlling shareholders face strong incentives to monitor managers and maximise profits when they retain substantial cash-flow rights in addition to control. A new concern arises however: the risk of expropriation of minority shareholders by block-holders.

As far as banking stability is concerned, the structure of ownership also matters for its impact on the riskiness of the bank. When shareholders acquire real control by holding substantial voting rights, it is easier for them to push managers to engage in risk shifting (Harm, 2002, Caprio and Levine, 2002) and increases the potential to extract private benefits (Bebchuk, 1999). However, in the case of financial distress, a bail-in may be easier to organise when there is a well-identified block-holder, which may in turn induce him to take less risk (Bolton and von Thadden, 1998 and Hagelin, 2003). As already stressed, shareholder dispersion thus has a potentially ambiguous effect on banking stability (see also Saunders, Strock and Travlos, 1990).

In the case of dispersed ownership, individual shareholders have little incentive to monitor managers and would rather free-ride on others. This means real control for managers who, except in the case of very high-powered incentive schemes, have less of an incentive to engage in excessive risk taking. However, dispersed ownership may also lead to potentially unstable ownership (i.e. shareholders voting with their feet when trouble is under way, or unfit shareholders gaining control over the bank by acquiring shares on the market). This may frustrate banking stability objectives.

(11) In practice, in a competitive managerial market, it may be difficult to limit option-based compensation. If the decrease in the option-based remuneration is not compensated by an increase in the cash remuneration, there is a risk that banks would no longer be able to attract good managers. On the other hand, if this decrease is compensated by higher fixed remuneration, banks may attract managers who would prefer higher fixed remuneration and lower variable compensation, i.e. risk averse managers.

Apart from the extent of shareholder dispersion, risk taking is also going to be influenced by the identity of the controlling shareholder. Risk incentives may differ if a bank is owned by another financial institution, a family, an industrial firm, or its own management. Indeed, these different owners have different opportunities to diversify their wealth and hence different attitudes to risk. Moreover, they differ in their information, expertise and monitoring capabilities. As shown in Box 2, most Belgian banks are owned by other financial institutions. This may increase the possibility of contagion (through the direct impact on the balance sheet and financial links or through spill-over effects). On the other hand, banks may be effective monitors of other banks, especially if they have large exposures on the interbank market. Cross-shareholding may also be useful as an incentive to perform this monitoring role.

Box 2 – Shareholding structure in Belgian financial groups

TABLE 2.1 FIVE LARGEST DIRECT SHAREHOLDERS OF A SAMPLE OF BELGIAN FINANCIAL GROUPS (1)

	Assets (In millions of euro)	1	2	3	4	5	Names
		(In percentages)					
Listed (2)							
Dexia	349,888	15.3	14.9	7.7	5.7	3.1	(1) Arcofin; (2) Holding Communal; (3) Caisse des Dépôts et Consignations (French State); (4) Ethias; (5) Deutsche Bank
Fortis (3)	523,250	6.1	5.5	2.8	2.3	1.7	(1) Suez Groupe; (2) Stichting VSB Fonds; (3) Fortales; (4) Munchener Ruckversicherung; (5) Fortis
KBC bank and insurance (4)	225,587	66.7	1.9				(1) Almanij; (2) KBC Group Companies
Keytrade (5)	368	28.5	22.5	9.5	9.5	9.5	(1) Van Moer, Santerre et Cie; (2) Compagnie Centrale 1909; (3) De Streel Grégoire; (4) Zurtstrassen Jean-Guillaume; (5) Zurtstrassen José-Charles
Not listed (6)							
Axa Belgium	13,981	100.0					(1) Axa Group (7)
Banque Degroof	2,550	36.5	16.3	13.2	11.9	4.0	(1) Guimard Finance SA and families Philippson, Siaens, Fontaine, Schockert, Haegelsteen; (2) Active Partners; (3) Compagnie du Bois Sauvage; (4) Management & Personel; (5) Parmafin (Family Theo Maes)
HSBC – Dewaay	343	100					(1) HSBC
Bank Corluy	102	62.5	37.5				(1) Group Corluy (family); (2) Mercator Bank en Verzekering
Bank Delen	846	100					(1) Finaxis (8)
Bank J. Van Breda	1,901	100					(1) Finaxis (8)
ING Belgium	121,045	99.6					(1) ING Group (9)

Sources: Annual Reports, Banks' website, ING, Bankscope.

(1) An ultimate owner or controlling shareholder is a shareholder holding directly or indirectly more than 20 p.c. of the shares (La Porta et al. 1998). It is believed 20 p.c. of the shares is often enough to control a company.

(2) December 2003.

(3) On April 24, 2003, Suez issued a 3-year convertible bond which will be redeemed at maturity in a maximum of 70 million Fortis shares. Suez's potential voting rights (fully diluted) will then drop from 6.40 p.c. to 1.44 p.c. or more.

(4) See separate Box 3.

(5) Listed shareholders acting jointly.

(6) December 2002 except Banque Degroof and ING Belgium: December 2003.

(7) Ultimate owner is Mutuelles AXA.

(8) Owned by Ackermans & van Haaren (60 p.c.) and Groep J. Van Breda (40 p.c.).

(9) ING bank launched a squeeze-out procedure in April 2004.

The shareholding structures of the various Belgian banking groups differ widely (Table 2.1). The shareholding structure of Fortis, the largest Belgian financial group, is dispersed. However, Fortis has two reference shareholders: Suez Group and VSB Fonds. They both hold around 6 p.c. of the shares. KBC has a more concentrated ownership. The main shareholder of KBC is Cera Holding (through its participating interest in Almanij). As explained in Box 3, the shareholding is more or less similar to a pyramid. The shareholding structure of Dexia is relatively concentrated, as two shareholders each have more than 14 p.c. of the shares and 2 others both have more than 5 p.c. of the shares. Finally, ING Belgium is a subsidiary of ING group, a Dutch company. The smaller banks that are presented tend to have concentrated ownership.

Note also that although some large financial groups are listed, individual banking entities are not (the only exception being Keytrade). The fact that the banking activity is not listed has an impact on market discipline. Indeed, direct market discipline on bank entities through share price cannot be exercised, even though banks are generally monitored by rating agencies.

TABLE 2.2 OWNERS OF BELGIAN BANKS
(December 2003)

Major shareholder categories	Number of banks	Percentage of banks	Percentage of total assets
Foreign financial group	24	39.3	17.7
Belgian financial group	12	19.7	21.4
Listed banks with no shareholder owning more than 50 p.c.	2	3.3	56.6
Family structure	10	16.4	2.5
Professional credit associations	9	14.8	0.4
Other (1)	4	6.6	1.4
Total	*61*	*100.0*	*100.0*

Sources: CBFA, Bankscope, Schema A and own calculations.
(1) Other includes: (i) public authorities, (ii) consortium structure, (iii) Belgian or foreign non-financial groups.

Table 2.2 presents a breakdown of banks by the identity of their direct main shareholder. We observe that a large number (39 p.c.) of Belgian banks are owned by foreign shareholders, generally foreign financial institutions, yet they only represent 18 p.c. of the total assets of Belgian banks. Note that if we add to this the 20 p.c. owned by Belgian financial institutions, we find that 59 p.c. of Belgian banks are owned by another financial institution, accounting for 39 p.c. of the total assets of Belgian banks.

Shareholders exert power through their voting rights. In some environments, voting rights are directly proportional to cash-flow rights, so that it is enough to look at ownership concentration to have an idea of formal control rights of shareholders. In other environments, there is widespread use of technologies that give shareholders voting rights in excess of their cash-flow rights. Box 3 explains these mechanisms in detail. In most cases, these mechanisms are used to increase the power of the large shareholder, who may find such a strategy attractive when wealth constrained and only willing to invest if in control. As controlling shareholders value a voting premium as a form of private benefit, they will not sell their shares to small shareholders. This is because small shareholders do not value these private benefits and hence will not be willing to pay for these voting rights (Grossman and Hart, 1998). These mechanisms may therefore lead to stable control.

Recently, however, there have been many debates about whether these mechanisms are a sign of bad corporate governance.[12] This is because control rights that

(12) In its effort to draft a "takeover directive", the European Commission proposed to ban multiple voting rights. In Belgium, dual voting rights within one class of shares are not allowed and one-share-one-vote is the rule (art 541 corporate law). The OECD principles on corporate governance (2004) do not go that far, only stipulating that such arrangements should be disclosed. From a banking stability point of view, note that some of these arrangements may have some benefits when they lead to stable ownership structures.

significantly exceed cash-flow rights may distort incentives to the disadvantage of small investors. Bebchuk et al. (1999) show that this may cause considerable agency costs. Neither proxy contests nor hostile take-overs are possible, limiting the discipline of the external market and raising moral hazard concerns.

This analysis demonstrates that there is no clear answer to the question whether the RSA should favour dispersed or concentrated bank ownership. To some extent, there is an underlying trade-off between stable ownership and managerial autonomy, a trade-off that, as section 4 will show, the RSA in Belgium has tried to balance by introducing a special supervisory agreement.

Box 3 – Technologies separating cash-flow rights from voting rights

The trust office

One mechanism, frequently used in the Netherlands to separate cash-flow rights from voting rights is the trust office ("administratiekantoor"). A trust office holds the original shares of the company and issues "depository certificates". Certificate holders, in addition to receiving dividends, retain the right to attend and speak at shareholders' meetings, but they generally have no voting rights. Instead, the votes are cast by the trust office. Depending on its exact implementation, it may also serve as a mechanism to give real control to managers rather than shareholders. Trust offices very often represent large shareholders (if not all).

Often, trust offices serve as anti-take-over defences. As the supervisory board appoints the board members of the trust office and as the shareholders cannot exert their voting rights, it becomes impossible to take control of the firm through a hostile take-over. This mechanism also limits shareholder power and ensures managerial autonomy. On the other hand, the trust office has a lot of power and if it actually acts in the interest of (a subgroup of) shareholders, these are very well represented, whether they attend the shareholder meeting or not. This is in contrast with firms where uncast votes are handed over to the management.

When looking at the Netherlands, it seems that trust offices have been effective in protecting banks from foreign hostile take-overs without preventing company growth. These days however, the trend, at least in banking, is to gradually eliminate this Dutch peculiarity and to give more power to shareholders.[(1)]

Preference shares

Preference shares constitute another widely used device. Unlike the trust office, preference shares do not increase the power of management, but affect the balance of power among shareholders. Preference shares may have several special features regarding dividend, seniority and voting rights. For example, the preference shares used by ABN-Amro give a right to a fixed guaranteed dividend of 5.5 p.c. of the face value, are senior to ordinary shares (but junior to debt) upon liquidation, and carry multiple voting rights. Hence, with respect to their pay-off, preference shares resemble subordinated debt. They differ solely in their attached voting rights and their indeterminate maturity. Hence, the use of dual-class shares is a way to endow some shareholders with incentives that are more debt-like.

ABN Amro uses preference shares accounting for 2.7 p.c. of the market value of the equity of the bank but with 47 p.c. of its voting rights. More than 80 p.c. of these preference shares are held by only 6 shareholders. This means that, together with the ordinary shares owned by these shareholders, 46 p.c. of the voting rights are in the hands of a group owning only 17 p.c. of the market value of the equity of the bank. Hence, ABN Amro has a

(1) ABN Amro announced its intention to dissolve its trust office (Stichting Administratiekantoor ABN AMRO Holding). The board of directors of ING proposed that the holders of depositary receipts obtain a voting proxy for the full number of their depositary receipts, whether it is "peacetime" or not. This means that Trust Office ING Shares will only exercise a vote at its own discretion for those depositary receipts the holders of which are not represented at the Annual General Meeting and who have not given any voting instruction to the Trust Office ING Shares. Yet, the second trust office of ING, Trust Office ING Continuity retains its call option which gives the trust office the right to acquire cumulative preference shares. Fortis also has this kind of trust office (Stichting Continuïteit Fortis) which has been granted an option to acquire a number of Fortis preference shares. These two trust offices should be considered as anti-take-over devices. In order to prevent a hostile take-over, the trust is only given an option to buy cumulative preference shares in case of "wartime". This so-called "poison pill" does not limit the power of shareholders in "peacetime".

TABLE 3.1 CAPITAL STRUCTURE OF ABN AMRO

(Market value on December 31, 2003)

	Ordinary shares	Preference shares	Total	
	Percentage of shares		Percentage of market value	Percentage of voting rights
Aegon	0.4	13.5	0.7	6.5
Fortis	0.5	15.7	0.9	7.7
Delta loyd	0.7	9.9	1.0	5.0
ING	8.3	17.6	8.6	12.7
Rabobank	0.1	10.6	0.4	5.0
Zonnewijzer	0.0	14.2	0.4	6.7
Capital Group International, Inc.	5.2	0.0	5.1	2.8
Total	*15.2*	*81.6*	*17.0*	*46.3*
Other shareholders	84.8	18.4	83.0	53.7

Source: ABN Amro Annual Report 2003.

dispersed ownership, with concentrated voting rights.[2] The figures are presented in Table 3.1, which details the major shareholders' investment and the attached voting rights.

Until now however, ABN Amro has combined these preference shares with a trust office which made management quite independent of these shareholders. In its 2002 annual report, ABN Amro announced its intention to change on this front, as with the trust office. The bank is planning to purchase all outstanding preference shares. This is because pressure from current corporate governance practice for non-financial firms discourages the use of dual class shares as it limits transparency. This measure will be accompanied by the dissolution of the trust office. From an RSA point of view, however, these dual class shares may in some cases be favoured, especially if they lead to stable shareholders with incentives that are closer to those of debt holders.

Pyramid structure

Pyramid structures represent an alternative to dual-class shares that also increases block-holder power without changing income rights. In a pyramid of two companies, consider a controlling shareholder holding a controlling stake (s_1) in a holding company that, in turn holds a controlling stake (s_2) in an operating company. Assume one-share-one-vote and assume first that it takes $s_i > 0.5$ (i = 1,2) to exert control over the assets. Then, the fraction of cash-flow rights required to gain formal control is only $s_1 s_2 > 0.25$. With a cascade of n firms, control only requires a fraction of the cash-flow rights:

$$\alpha = \prod_{i=1}^{n} s_i \ .$$

where α is equal to the cash-flow rights held by the controlling shareholder

s_i represents the fraction of shares of firm i held by the controlling shareholder.

(2) However, it should be noted that in normal circumstances (i.e. peace time), as one ordinary share requires a significantly larger investment than one preference share, holders of depositary receipts for preference shares have the opportunity to acquire voting rights in the meeting of shareholders by proxy only, in proportion to the economic value of a preference share against that of an ordinary share. In addition, the trust office of ABN AMRO holding will exercise the voting rights in respect of preference shares for which no proxies have been issued.

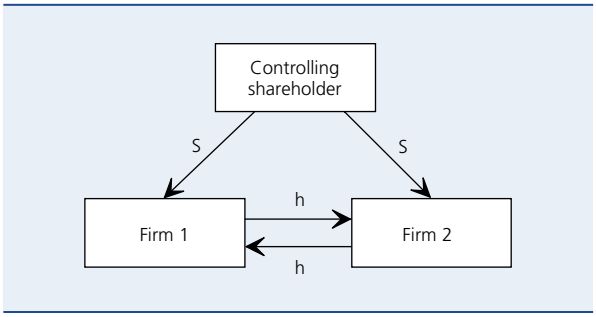
In the past, pyramid structures were common in Belgium. The shareholding structure of BBL, before it was acquired by ING, was an example of such structure. BBL was controlled by three shareholders acting jointly: Crédit Communal/Gemeentekrediet (12.5 p.c.), GBL (12.5 p.c.) and Royale Belge (12.5 p.c.).[3] The other shareholders included ING (20 p.c.) and Winterthur (8.2 p.c.). Although the shareholders were acting jointly, the control was mainly exercised by GBL.[4] GBL in turn was controlled by the Family Holding Frère-Bourgeois through a cascade of companies.[5]

A current rather a-typical example in the Belgian financial sector is KBC holding, as it emerged in 1998 out of the merger of KB Bank, Cera Bank and ABB insurance. KBC holding, which is listed on Euronext, is 70 p.c. controlled by Almanij, another listed financial holding company, which in turn is more than 70 p.c. controlled by a group of major shareholders. Among these shareholders there is another listed financial holding company, Almancora holding 28 p.c. of the shares of Almanij.[6] Almancora is 80 p.c. owned by Cera.

Cross ownership

The use of cross ownership to increase voting power is explained in the following figure.

FIGURE 3.1 CROSS OWNERSHIP STRUCTURE



In this symmetrical two company case, the controlling shareholder has a direct fraction of S shares, large enough to control both firms. Both companies have a cross-holding h. The indirect shareholding for the shareholder in each firm becomes S + h. The controller's fraction of the cash flow right (μ) is the ratio of its holding S over the total fraction of shares that is not cross-held (1-h): μ = S/(1-h). For any μ it is in theory possible to set up a cross-ownership structure such that the controller has formal control over the assets but no more than a fraction μ of cash-flow rights.

In the financial sector, cross-holdings are commonplace. For example, Fortis currently directly owns 7.7 p.c. of the voting rights in ABN Amro and an interest of between 5 p.c. and 10 p.c. in ING. ING has a direct participation in ABN Amro representing 12.7 p.c. of the voting rights, while ABN Amro holds 5 p.c. to 10 p.c. in ING. Indirectly, Fortis has thus more power over ING and ABN Amro than would be expected from the direct shareholdings. This calls for two remarks. First, from what was discussed previously, we know that voting rights attached to ABN and ING shares are handed over to a trust-office. Because of this, the power of Fortis is limited. Second, Fortis is not a controlling shareholder in ING nor in ABN Amro. This means that Fortis has only partial control over the shares held in the cross-holding between ING and

(3) The ultimate owner of Royale Belge was Royale Vendôme (52 p.c.), partly owned by UAP (75 p.c.) and GBL (25 p.c.).

(4) See e.g. Delvaux and Michielsen (1999).

(5) In 1995, GBL was controlled by Pargesa Holding (47.4 p.c.) which in turn was controlled by Parjointco (55 p.c.). Parjointco was jointly controlled by Power Corporation (a Canadian holding company controlled by Paul Desmarais, owning 50 p.c. of the shares of Parjointco) and by Agesca Nederland (50 p.c.). Agesca Nederland was controlled by the Compagnie Nationale à Portefeuille/Nationale Portefeuille Maatschappij (89.5 p.c.). The Compagnie Nationale à Portefeuille/ Nationale Portefeuille Maatschappij was controlled by Fibelpar (46.2 p.c.) which in turn was controlled by Erbe (54.1 p.c.) which was controlled by the Family Holding Frère Bourgeois (54.5 p.c.). For more information, see e.g. Chapelle and Szafarz (2002) or Becht et al. (2001).

(6) Almancora, was set up after a legal dispute, in order to allow mutual shareholders of Cera holding, a cooperative and formerly the owner of Cera Bank, to make their stakes in Cera more liquid by converting them into Almancora shares.

ABN Amro. Hence, there may be other reasons for these cross-holdings, e.g. strategic, financial (in a bankinsurance model, cross ownership can also result from the investment portfolio of the insurance company. In that case, investments are not made for control purposes but may serve a strategic purpose), historical or cross-monitoring reasons. Yet the last reason could also present some drawbacks. Indeed, if a bank acquires a significant participating interest in a competitor, and a seat on its board of directors in order to monitor that firm, this creates potential conflicts of interests which may in the end considerably weaken the role of the board and undermine its supervisory function.

3.3 Structure of the board of directors

Voting rights in the general meeting of shareholders are not the sole source of power. Influence in the board is important too. Of course, voting rights and influence in the board are related. However, the power of the board over the firm's decisions may differ, depending on the board structure, i.e. the number of independent, executive and non-executive members, shareholder representatives, appointment procedures, committees, nomination period, etc. Box 4 presents some evidence on the current functioning of boards of directors in Belgium.

The monitoring function of the board is especially important for banks, where monitoring by depositors is non-existent. The complexity of operations impedes monitoring by those sparce, uninsured creditors, and banking regulation often makes take-overs (and thus market discipline) more difficult. In addition, one can also argue that the role of the board is different from its role in non-banking organisations. Normally, the board acts in the interest of the shareholders. Besides the fact that this is a legal obligation, this can also be justified by the fact that shareholders are the only stakeholders that can credibly contract with the other stakeholders, as they have the strongest incentives at the margin (Easterbrook and Fischel, 1983). In banks, however, shareholders cannot credibly commit to an implicit contract with debt holders. As the latter are not represented, shareholders will not internalise the interests of debt holders. (Macey and O'Hara, 2003). A solution may be to give bank boards of directors fiduciary duties not only towards shareholders but also towards debt holders. Hence, bank boards should comprise more independent members and fewer representatives of the shareholders. Bank directors should also receive less equity-based compensation. The latter idea is confirmed by Becher, Campbell and Frye (2003). They compare a sample of 700 observations from 81 US banks with 13147 observations from non-banks over the period 1992-1999. They find that, on average, bank directors' remuneration consists of 18.72 p.c. equity-based pay compared to 31 p.c. for non-bank directors. This difference declines over the sample period.

Gillette et al. (2003) show that having a majority of independent board members (outsiders) is not enough to guarantee efficient board performance. What also matters is the way in which board members consult each other. They simulate the functioning of a board of directors comprising insiders and outsiders in laboratory experiments with human subjects. Their experiments provide support for the hypothesis that boards dominated by outsiders tend to produce the outcome which maximises firm value. In addition, allowing for communication between outsiders (whatever the communication protocol used), favours the adoption of the socially efficient outcome. Hence, in order to foster efficiency[13], coordination between outsiders should be enhanced. This implies that boards where the outside members can consult one another in private will be more efficient. This is an argument in favour of a two-tier board structure.

(13) Efficiency refers to the fact that decisions of the board pursue firm value maximisation

Box 4 – Board structure of Belgian banks

Board composition

Table 4.1 presents the structure of the board of directors of several Belgian banks. A breakdown is made between executive and non-executive members. Among the non-executive members, we distinguish between independent and non-independent directors. This distinction is based on information provided in annual reports and is thus based on a self-assessment of each board of directors.

TABLE 4.1 COMPOSITION OF THE BOARD OF DIRECTORS OF SEVERAL BELGIAN BANKS

(Independence distinction is based on information provided in annual reports of banks and is thus based on a self-assessment of each board of directors)

	Level	Executive members	Non-executive members			Total	Separation chairman / CEO?
			independent	not independent	not classified		
Listed							
Dexia [1]	Group	1	8	9		18	yes
Fortis [2]	Group	1	11			12	yes
KBC	Group	8	4	11		23	yes
Keytrade	Bank	4			7	11	yes
Non listed banking entity of listed Belgian financial group							
Dexia	Bank	7			19	26	yes
Fortis [3]	Bank	10			11	21	yes [4]
KBC	Bank	5			8	13	yes [5]
Not listed							
Axa Belgium [3]	Bank	6			7	13	yes
Banque Degroof	Bank	9	3	5		17	yes
HSBC – Dewaay	Bank	4			6	10	yes
Bank Delen	Bank	5			7	12	yes
ING Belgium [6]	Bank	6			10	16	yes

Source: Annual Reports 2003 and Bankscope.

(1) On March 4, 2004, the board of directors of Dexia appointed Anne-Marie Idrac as a provisional replacement for Paul Louis Halley, who died on December 6, 2003. On December 31, 2003, there were thus 8 independent directors instead of 9.

(2) The board of directors of Fortis appointed 5 new non-executive directors in 2004, in replacement of 4 non-executive directors who had reached the end of their term of office. The board of directors of Fortis now counts 12 non-executive directors. Fortis also announced other changes including the replacement of the co-chairmanship structure by a single chairmanship and the end of the parity between Belgian and Dutch directors.

(3) December 2002.

(4) Chairman of the board of Directors at the bank level is CEO at the group level.

(5) Same chairman at the group and at the bank levels.

(6) ING Belgium modified the composition of its board in April 2004. The board of directors of ING Belgium now counts 9 non-executive directors and 6 executive directors.

With regard to the board structure, there are some significant differences among Belgian banks. There is no (implicit) rule with regard to the composition of the board or to the number of directors. [1] The number of directors in Belgian banks ranges from 10 to 26. The number of independent directors also varies. The majority of directors in Fortis and Dexia are independent. In KBC, only a minority of the non-executive members are independent.

(1) Yet note that the Report of the Belgian Commission on Corporate Governance recommends limiting the size of board of a firm in general to no more than 12 directors.

TABLE 4.2 COMPOSITION OF COMMITTEES OF KBC, DEXIA AND FORTIS (GROUP LEVEL)

Committees	Fortis	Dexia	KBC
Audit	Composition : 6 independent board members. Meetings in 2003:5.	Composition : 4 board members (two of whom are independent). Meetings in 2003:4.	Composition : 9 non executive board members (3 of whom are independent). Meetings in 2003:6.
Appointment / Nomination	1 appointment and compensation committee consisting of 7 board members, including 6 independent board members and the CEO. Meetings in 2003:3.	Composition : 6 board members (comprising the Chairman, the CEO and 2 independent directors). Meetings in 2003:4.	The Agenda committee acts as an appointment committee.
Remuneration / Compensation		Composition : 3 non-executive directors (the Chairman and 2 independent directors). Meetings in 2003:2.	Composition : 3 non-executive directors (including 1 independent director and 2 representatives of the principal shareholder). The committee meets on an ad hoc basis.
Strategy	NA	Composition : 6 board members (comprising the Chairman, the CEO and 2 independent directors). Meetings in 2003:1.	NA
Agenda	NA	NA	Composition : 6 members (including the Chaiman of the board, the President and Vice-President of the executive committee and 3 non-executive directors). The committee meets prior to each Board meeting.
Risk and Capital	Composition : 5 board members (of whom the CEO). Meetings in 2003:3.	NA	NA

Source : Annual Report 2003.

The three large Belgian banks use a different definition of independence, although they all comply with the new legislative act of August 2002. Therefore, the figures in Table 4.1 are not totally comparable. KBC relies only on the definition of independence given in the Corporate Law. The board of directors of Fortis uses its own definition of independence. For instance, Fortis' definition of independence does not take account of a maximum term of office. Banque Degroof used the recommendations of Euronext Brussels. (2) Finally, Dexia uses criteria that are even more stricter than those of the Bouton White Paper (3) and the Belgian Corporate Governance Law. This illustrates how difficult it is to define independence. (4)

(2) Belgian Commission on Corporate Governance (1998), Report.

(3) MEDEF, "Pour un meilleur gouvernement des entreprises cotées : rapport du groupe de travail présidé par Daniel Bouton, président de la Société Générale", September 2002.

(4) Criteria for independence refer to directors with no ties with shareholders or managers. The latter criterion tend to be emphasised in the Anglo-saxon corporate governance model relying upon dispersed shareholder, the former is more relevant for the Continental corporate governance model with concentrated ownership. Although there is no single definition of independence, it is at least possible to identify some dependence criteria. The list of criteria given here is based on the Dutch Corporate Governance Code (Corporate Governance Committee, "The Dutch Corporate Governance Code : principles of good corporate governance and best practices provisions", December 2003. This report is also known as the Tabaksblat report) and on the Bouton White Paper. They combine both criteria from the Anglo-Saxon and the Continental model. A director may not be considered as independent if one of the following criteria applies to him, his wife, or child or relative up to the second degree :

At the bank level, managers seem to have an important say in the board. This is because the Agreement on the autonomy of bank management stipulates that members of the managing board must be chosen from among the members of the board of directors.[5] Executives, however, may not be in the majority. In addition, the total number of board members seems to be quite large. This might raise difficulties in board decision-making, as there may be moral hazard in teams. Therefore, it is important to establish subcommittees. This is addressed in the next paragraph.

Board organisation

The board of directors may delegate some of its responsibilities to committees made up of a limited number of directors. Table 4.2 summarises committees created by Dexia, KBC and Fortis. There is no universal definition of the scope of competencies of each of these committees. The prerogatives of the committee and its members are determined at the board level.

All the banks represented in the table make use of several specific committees. It seems that there are large differences in board structure between banks. An audit committee and a remuneration committee are nowadays commonplace in a lot of firms across many industries. Yet, their composition varies widely. For instance, the audit committee of Dexia contains 4 members but 9 members in the KBC case. The existence of a strategy committee or a risk and capital committee is maybe less frequent. Codes of best practices recommend that the board of directors establish rules that define the roles and responsibilities of each of these committees. With regard to the composition of the audit committee, the Bouton White Paper recommends that, if such a committee exists, it should comprise at least two-thirds independent members and no current or former managers. In addition, members of the committee should be finance or accounting experts. The audit committee should supervise the internal control, the internal and external audits, and check compliance with their recommendations.

The Bouton report defines the optimal composition of the remuneration committee. The committee should comprise a majority of independent members and no executive directors. The remuneration committee should make proposals with regard to the remuneration package of directors, members of the managing board and high level employees of the firm. A crucial element of this package is the importance of the variable element (cf. supra).

(5) Note that the agreement applies at the bank level and not at the group level. Therefore, we see that banks such as Fortis or Dexia only have one executive member on the group board while the whole managing committee is represented at the bank level.

4. A special supervisory instrument: The agreement on the autonomy of bank management

The fact that the agency conflict in banks differs from the agency conflict in non-financial firms creates a need for an RSA. The exercise of the RSA function is facilitated by sound corporate governance structures in banks. Therefore, the RSA may try to govern the relationships between shareholders, directors and managers. The Belgian supervisory model makes use of an original instrument to govern these relationships: the Agreement on the autonomy of bank management. To the best of our knowledge, this instrument is rather specific to Belgium. First, the instrument itself is original, in the Belgian tradition of developing rules and regulations by way of soft law. Supervisory intervention served mainly as a substitute for formal regulation and formed a body of informal company law aimed at policing the conduct of major companies (see e.g. Wymeersch, 1994). Second, the content of the agreement is not necessarily included in the legislative framework of neighbouring countries.[14]

Although the stated purpose of the autonomy agreement is to guarantee the stability and the continuity of the banking function, the historical background lends itself to a more limited interpretation (for an historical overview of the agreement on the autonomy of bank management, see Appendix 1). Indeed, the agreement on the autonomy of bank management has its roots in the desire to avoid conflicts of interests within group structures (in mixed banks or in industrial holding companies). As structural regulation failed to fully solve conflicts of interests in credit policy, the CB[15] started to negotiate agreements with bank shareholders to ensure the independence of bank management in credit policy. As such, it focused on credit risk and did not target the general problem

(14) One should, however, note that the Italian legislation contains a provision pointing out that the Bank of Italy may request a sort of "declaration of independence" from the participants in the capital of a new bank in the occasion of its setting up (see also Lombardo, 1993).

(15) The Commission for Banking (CB), the Belgian RSA, was set up in 1935. In 1990, it was renamed the Commission for Banking and Finance (CBF). In 2003, the CBF merged with the OCA/CDV, the agency in charge of the control of insurance companies, to form the Commission for Banking, Finance and Insurance (CBFA). The text thus uses the abbreviations CB, CBF and CBFA, depending on the period it is referring to.

of banking risk. To this end, the agreement establishes a clear distinction between the managing board of a bank and its board of directors. In addition, it tries to reinforce the independence of a bank's management and to protect it from any external influence.[16] The goal of this section is to present this special and unique feature of the Belgian supervisory model, i.e. the agreement on the autonomy of bank management.[17] This subsection first retraces the tradition of autonomy agreements in Belgium. Subsequently, it investigates the future for a (revised) autonomy agreement.

4.1 The Belgian autonomy agreement

The current agreement rests on two pillars. Its first pillar is based on a clear distinction between management and supervision:

- The managing board is in sole charge of the banking function and should pursue the interests of the bank to the fullest. The managing board manages the credit institution according to the general policy defined at the board of directors' level. The managing board is composed of members of the board of directors and constitutes a collegial body.
- Supervision of the management is the prerogative of the board of directors. The latter also defines the general policy of the bank and has the power to appoint and dismiss members of the managing board. The scope of the general policy includes planning, budgets, important structural reforms, and relationships between the bank and its shareholders.

The second pillar of the agreement specifies the rights and duties of significant shareholders.[18] First, the agreement clearly states that, despite their specific role, significant shareholders have the right to expect a normal return on their investment. In addition, they are actively represented in the board of directors and subsequently play a role in the definition of the general policy and the supervision of the bank. Significant shareholders, however, may not use their influence to interfere with the business management. They also undertake to support the credit institution, to guarantee its stability and to ensure the autonomy of its management. They agree to inform the managing board, the board of directors and the CBFA prior to any changes in the size of their participating interest. The CBFA may recommend suspending the disposal operation for a period of three months if this operation threatens the stability of the bank or the independence of its management or if shares are transferred to an unsuitable shareholder.[19] Table 1 provides a summary of the content of the agreement. The information presented in Table 1 is based on a standard agreement on the autonomy of bank management. However, the agreement provides that any party may request a modification of the agreement, although the modification needs to be accepted by all the other parties (including the CBFA) and by the shareholders meeting.

Each bank ratifies voluntarily the agreement after negotiations with the CBFA. One of the incentives that the banking industry may find to ratify the agreement is to avoid the development of a formal *one-size-fits-all* legislation containing the provisions of the agreement.[20]

The agreement is essentially a compromise that tries to combine the advantages of a stable shareholder structure with the advantages of autonomous management. Section 3 showed that there is typically a trade-off between the existence of a reference shareholder and managerial autonomy. The agreement thus tries to impose management autonomy in every shareholder structure by limiting the intervention of shareholders in the management of the bank. It ensures the autonomy of the banking function by the introduction of a structure similar to a two-tier board of directors. Instead of structurally breaking up the group, it introduces a governance solution reminiscent of Chinese walls. In addition, through its second pillar, the agreement tries to ensure stability of ownership by placing restrictions on the disposal of shares. Indirectly, restrictions on the sale of shares also constitute recognition that concentrated ownership provides more stability and hence better protection for parties that have contractual relationships, such as depositors. The agreement thus implies an uneasy compromise, as significant shareholders have to give up control and at the same time accept additional responsibilities, such as supporting

(16) This, however, also results in a great need for internal and external control, as the monitoring function of shareholders is weakened. Banks are therefore subject to a cascade of control. This cascade of control is often symbolised by four concentric circles. The inner circle represents the internal control, the second circle, the internal audit, the third circle the external audit and the outer circle the CBFA. Note that the role of the external auditor and the nature of the auditor's contact with the supervisory authority are rather special in Belgium. The external auditor function in fact combines a private mandate (defined in the corporate law – this mandate relates to the protection of shareholders) and a public mandate (co-operation with the CBFA – this mission relates to the protection of debt holders). The co-operation with the supervisory authority not only encompasses a signalling function (i.e. the auditor reports directly to the CBFA any decisions, facts or developments that could significantly influence the position of the credit institution or that are in conflict with corporate law, with the articles of association or the banking law) but also a supervisory function based on compliance forms. The auditor must thus perform a number of additional tests for a supervisory purpose.

(17) A similar agreement, the agreement on the autonomy of insurance management, also exists for the insurance industry. This instrument resulted from negotiations between the CDV-OCA and insurance companies.

(18) Note that there is no formal definition of a significant shareholder. The agreement specifies that "*insofar as the voting rights attached to a participating interest may have a de facto influence on [general] shareholders' meetings, such a participating interest will imply an institutional role for the shareholders concerned, a role which, considering the powers they have, imposes corresponding duties to support the credit institution's stability, development and autonomy*".

(19) However, the agreement does not define "unsuitable shareholders".

(20) Yet, although the banking industry as a whole has an interest in the approval of agreements, this is not the case for each of the significant shareholders of individual banks of the system. Therefore, it opens the door to free-riding types of behaviour, in which some banks might decide to refuse to negotiate the agreement.

TABLE 1 CONTENT OF THE AGREEMENT ON THE AUTONOMY OF BANK MANAGEMENT

	Managing Board	Board of Directors	Shareholders
Role	The managing board is responsible for the business management of the credit institution. This management is to be carried out without external interference in the context of the general policy laid down by the board of directors. The board of directors confers on the managing board powers to take decisions and represent the bank with regard to its staff, its customers, other credit institutions, other economic and social entities and the authorities. The CBFA is to be consulted with regard to the scope of powers delegated to the managing board. The managing board will constitute a collective body with collective responsibility.	The board of directors defines the general policy (on its own initiative or following a proposal by the managing board). The general policy includes the definition of the bank's strategic direction, the approval of plans and budgets, significant structural changes and restructuring, and the definition of relationships between the credit institution and its shareholders. The board of directors exercises effective supervision over the management and the business. To this end, the managing board and the external auditor regularly report to the board of directors. In addition, the board has a right of investigation. The board may call upon the assistance of an audit committee consisting of directors who are not members of the managing board. The chairman of the board of directors will ensure that powers are correctly distributed between the board of directors and the managing board.	Significant shareholders undertake to support the credit institution, to guarantee its stability, to ensure the autonomy of its management and to create the conditions necessary for ensuring sound, objective and prudent management of the bank. They accept that the bank is not merely an instrument for serving their own interest, but also has other interests which must be taken into account in banking. They undertake not to vote during the general meeting for the removal from office or the non-renewal of the director's mandate of a member of the managing board or of the chairman of the board of directors without having sought the opinion of the board of directors and the managing board and the approval of the CBFA. They play an active role within the board of directors in defining the general policy, supervising its activities and management, and appointing the members of the management committee. They communicate the size of their participating interest each year to the CBFA and the board of directors.
Composition	Members of the managing board must be under 65 and must have the required professional integrity and experience. The managing board is composed of members of the board of directors. After consultation of its board, the chairman of the managing board must advise the chairman of the board of directors of the candidates proposed for nomination as chairman and as members of the managing board. If the chairman of the board of directors approves the proposal, he submits it to the board of directors. Otherwise he makes a counter-proposal to the chairman of the managing board. If the managing board disagrees, both chairmen try to reach a consensus on a single candidate. Otherwise, each chairman submits his proposal to the board of directors. The approval of the CBFA is required before any proposal to the board of directors. The board of directors may decide whether to revoke or not to renew the mandate of a member of the managing board only after obtaining the opinion of the managing board and of the CBFA.	The board of directors ensures that shareholders' interests are adequately represented and includes the members of the management board. The board may have a majority of representatives from those shareholders who have signed the agreement. Members of the managing board may not form a majority on the board of directors. Independent directors may also be appointed as directors in order to diversify the composition of the board. The credit institution ensures that the number of directors is limited. The chairman of the board of directors is appointed by the board of directors from among those directors who are not members of the managing board. The CBFA is to be consulted beforehand on the appointment and departure of the chairman of the board of directors. The appointment and removal from office of the chairman of the board of directors is subject to the prior approval of the CBFA.	In order to protect the credit institution's autonomy, arrangements are to be made to prevent an unsuitable shareholder from acquiring a significant participating interest in the credit institution. Any change which would directly or indirectly result in a significant increase or decrease in the relative size of the participating interest of a significant shareholder is subject to the opinion of the board of directors and the managing board of the credit institution and to prior consultation with the CBFA. If such change would be likely to affect the stability or the autonomy of the institution, the CBFA may recommend implementation to be suspended for a maximum of three months. This recommendation may be made public.

Remuneration	The board of directors sets the remuneration of the managing board, after seeking the opinion of the chairman of the managing board. The remuneration covers all functions performed by the members of the managing board within the credit institution, including their functions and mandates in companies where the credit institution has a participating interest. Where this remuneration includes a variable element, it may not be calculated on the basis of items classified as operating expenses. The allocation of remuneration among members of the managing board is subject to internal rules approved by the board of directors.	The remuneration of the board of directors consists solely of attendance fees or fixed remuneration, to be decided upon by the general meeting and, where appropriate, an annual fee laid down in the credit institution's articles of association based on the dividend paid or a portion thereof.	The particular role of the shareholders in no way impairs their right to expect the credit institution's management to generate a normal return on their investment.

the credit institution and guaranteeing its stability. Yet, shareholders can still exert influence through the board of directors. This influence is limited, as the prerogatives of the board of directors are restricted to the definition of the general policy and the supervision of the bank. Managing the bank is the exclusive competence of the managing board and must be carried out without any external interference, in the context of the general policy defined at the board level. So, solving the first agency problem (i.e. the potential abuses by controlling shareholders) may result in reintroducing another problem of governance, namely, the separation of ownership and management.

4.2 What future for an autonomy agreement ?

The agreement on the autonomy of bank management is a special instrument to be situated between regulation and corporate governance codes. However, due to this special position, the agreement is challenged as, on the one hand, bank regulation has changed and, on the other hand, the corporate world is increasingly focusing on governance codes. More importantly, structural changes in the banking landscape might call for changes in the agreement. We discuss here the emergence of financial conglomerates, the move towards foreign and dispersed ownership, and the changes in regulation. These all have an effect on the functioning of the agreement on the autonomy of bank management.

4.2.1 Bank ownership after the merger wave of the 90's

The ownership structure of Belgian bank holding companies has considerably evolved over the last 20 years. This may call into question the efficiency and the usefulness of the autonomy agreement. First, compared to 1974, when the agreement was applied to 50 banks, shareholding structures of bank holdings seem to be less stable, as changes in ownership structure are becoming more frequent in Belgium (see e.g. the M&A waves of the 90's). However, the stability of the ownership structure is essential for the effective application of the agreement. Too frequent significant changes in the ownership structure might become difficult to manage, as each significant change in ownership composition demands a renegotiation of the agreement. Second, we observe that the traditional industrial holding group structure, as well as the pyramid structure, are tending to disappear. Several large Belgian banks are now owned by foreign financial groups with a more dispersed ownership structure[21], although large differences still persist (see Box 2). In principle, dispersed ownership increases the power of managers, while foreign owners may be difficult to control. This changes the nature of agency conflicts and subsequently decreases the need for the first pillar of the agreement, while the second pillar becomes more important.

4.2.2 Banking structures

While the former industrial holding structure was disappearing, another structure emerged, namely the financial conglomerate structure, combining banking, insurance and securities activities (National Bank of Belgium, 2002). At the top of the conglomerate is the financial holding company, which is often listed. The holding company may

(21) At the holding company level.

have a banking statute, but this is not necessarily the case. Each sector of activity is placed under a subsidiary. The subsidiaries are not listed, but are owned by the holding company. Hence, the bank has a concentrated ownership, while the holding company may have a dispersed ownership (see Box 2).

The introduction of this structure changes the nature of the conflict of interests. The main sources of conflicts of interests in these structures are no longer the relationships between majority and minority shareholders but the contagion between several sectors of activity and the consequences for the claimholders of the institution. Indeed, risks taken in one sector of activity (e.g. insurance) can influence another sector of activity (e.g. banking), and vice-versa. This may lead to the cross-subsidisation of one category of claimholders (e.g. insurance policy holders) by another category (e.g. bank depositors). Hence, although the conglomerate structure may improve risk management and efficiency, it reintroduces the risk of contagion between the different sectors of activity. In this context, it also changes the problem of the RSA. In particular, it raises the question of what would happen if the financial conglomerate comprised a weak insurance activity and a strong bank, and how would it be possible to protect bank debt holders in that situation. Increased transparency of the structure of the conglomerate and of the flows between sectors of activity is in any case needed. In addition, particular attention should be paid to general risk policy, as the risk of contagion depends on how the general risk policy (and not only the credit risk policy) is conducted.

Risk policy may be defined at the level of the sector of activity. This is especially the case when the subsidiaries operate at arm's length in relation to the holding company. In that case, each business line defines and manages its own risk plan. Consequently, the risk of the conglomerate is the combination of the separate risk plans of the sectors of activity. Yet, there is a tendency to define and manage risk at the group level in order to benefit from synergies and diversification effects.[22] How does the autonomy agreement cope with this trend? Currently, two separate agreements are concluded at the bank level and at the insurance company level, ensuring that the management of both the bank and the insurance company are independent (from each other and from their direct and indirect shareholders). Therefore, risk management remains the competence of the managing board of the bank or insurance company, whereas the board of directors may only define the general risk policy and supervise risk management. However, when the risk policy is defined at the group level, one might question the actual level of autonomy of the bank/insurance management.[23] On the other hand, is the autonomy of bank/insurance management desirable or is it better to allow risk management at the holding company level? It is also interesting to note that the agreement does not impose restrictions on the management of the holding company, whereas a lot of decisions are made at the holding company level. This may create the need for a special agreement at the holding company level. It must also be noted that the present regulation imposes separate regulations on the different sectors of activity.[24]

4.2.3 Legislative developments

Some rules of the autonomy agreement are now covered by several legislative acts. At the Belgian level, one can cite, for instance, the Banking Law of 22 March 1993, the law of 3 May 2002 implemented by the Royal Decree of 19 July 2002 concerning the exercise of external functions by directors and managers of credit institutions[25] and the Law of 2 August 2002 on corporate governance; at the European level, the new European Company Statutes regulation, and the European Directive on Financial Conglomerates.[26] Following these new developments, one could ask whether some elements of the agreement are not redundant, or worse, incompatible with current regulations.[27]

With regard to the first pillar of the agreement, article 26 of the banking law authorises (but does not oblige) the board of directors to delegate some of its competences to a managing board constituted by directors. However, if such delegation occurs, the definition of the general policy of the bank must remain the responsibility of the board of directors. The corporate governance law adds that, if a managing board is constituted, the supervision of this managing board is the task of the board of

(22) E.g. traditionally, the duration of a bank's assets is longer than the duration of its liabilities. The reverse is traditionally true for insurance companies. The interest rate risk of the insurance business is then negatively related to the interest rate risk of the bank business. See also National Bank of Belgium (2002).

(23) A similar problem arises in the relationships between a daughter company and its parent company when both are subject to the agreement on bank management autonomy, and raises the issue of consolidated prudential control. Indeed, the fact that the management of a daughter is autonomous does not exempt it from adhering to the strategy of its parent as regards risk control and management or internal audit. Conversely, the agreement on the autonomy of bank management may not be used by the bank parent company to gain exemption from any kind of control or responsibility.

(24) There has recently been some tendency towards convergence in the regulation of banks and insurance activities, although it is limited to regulatory techniques for capital requirements. This requires the co-ordinated supervision of banks and insurance companies. The move from CBF-OCA/CDV to CBFA can be seen in this light.

(25) To guarantee the separation of the managing and supervisory functions, non-executive directors may not hold executive functions in companies in which the bank has an interest.

(26) Directive 2002/87/EC of the European Parliament and of the Council on the supplementary supervision of credit institutions, insurance undertakings and investment firms in a financial conglomerate.

(27) For instance, this is particularly true with regard to sanctions and arbitration. The legislation generally punishes an infringement by a sanction, while for the same infringement the agreement will favour consultation and arbitration (this is of course due to the characteristics of this instrument).

directors.[28] Note here that, very clearly, the agreement on the autonomy of bank management sets up a stricter organisation and division of powers. In addition, articles 18 and 19 of the banking law stipulate that directors and members of the managing board must have the required professional integrity and experience, although the law does not establish any ex ante control by the CBFA. The Royal Decree of July 2002 also stipulates some incompatibilities in the exercise of external functions by the director or the manager of a bank.

With regard to the second pillar of the agreement, articles 17 and 24 of the banking law stipulate that the identity of shareholders owning more than 5 p.c. of the shares must be communicated to the CBFA in order to obtain a bank licence. Afterwards, communication is mandatory if the shareholding structure is modified. The CBFA has the right to refuse the licence if the CBFA judges that shareholders do not present enough guarantees with regard to the sound and prudent conduct of the bank. The law is even stricter than the autonomy agreement. For instance, the CBFA has the right to oppose the acquisition of shares by a shareholder that would threaten the sound and prudent conduct of the bank. The CBFA can also suspend the shareholder's voting rights and force this shareholder to dispose of his shares.

Although some elements of the agreement are redundant given the current legislation, the agreement still remains relevant. In particular, the agreement defines very precisely the separation between the supervisory function of the board of directors and the management tasks of the managing board. It also details the scope of intervention of the board of directors and the managing board. In addition, appointment and dismissal procedures are established so as to offer more guarantees for the independence of management. Moreover, a remuneration philosophy is defined, limiting the variable elements that can be taken into account in the remuneration.

There is also still the problem of financial conglomerates. The Financial Conglomerates Directives recommends coordination and additional supervisory review with respect to capital adequacy, risk concentration at the level of the financial holding company, internal control and risk management procedures and intra-group transactions. Indeed, article 8 of the Financial Conglomerates Directive stipulates that significant intra-group transactions (i.e. transactions that exceed at least 5 p.c. of the total amount of capital adequacy requirements at the level of the conglomerate) are subject to supervisory review. In addition, article 9 introduces adequate procedures to guarantee that the risk surveillance systems are integrated and that the systems are compatible so as to allow the risks at the level of the financial conglomerate to be measured, monitored and managed. However, one might wonder whether it sufficiently addresses the potential problem of internal conflicts of interest and of potential contagion between the sectors of activity. In Belgium, in particular, a new type of banking agreement could probably address more thoroughly the problems of transparency in risk accounting and efficient capital allocation among the sectors of activity in order to avoid excessive cross-subsidisation.[29]

4.2.4 Best practices in corporate governance

Corporate governance codes have become very fashionable in recent years.[30] These codes generally aim at establishing goals, guidelines and best practices for the effective governance of listed firms, and are thus not specific to banks. Yet, they may cover some aspects of corporate governance relevant for financial stability. In particular, some of these codes identify best practices linked to some issues dealt with by the autonomy agreement. First, these codes very often cover best practices with regard to the role of the managing board, the (disclosure of the) remuneration of the managing board, potential conflicts of interest, etc. In addition, current codes also address the functioning, the composition and the remuneration of boards of directors and of some of its sub-committees. Among the other issues addressed by these codes, the most frequent recommendations relate to shareholders, financial reporting and the internal and external audit function. While there is clearly some overlap between such codes and the agreement, this overlap is only partial, and codes do not necessarily make the agreement superfluous. Yet, it would be possible to envisage framing recommendations relating to bank stability within a revised agreement.

(28) Under the European Company Statute, defined by the Council in 2001 (Council Regulation No 2157/01 of 8 October 2001 on the Statute for a European Company), a company may have either a two-tier system with a supervisory board and a management board, or a one-tier system with an administrative board that manages the company. In the two-tier system, the management board (the members of the management board are appointed by the supervisory board) is responsible for managing the company. In the two-tier system, no person may be at the same time a member of both the management board and the supervisory board of the same company. The agreement seems thus to favour a hybrid (one and a half-tier ?) system where the members of the management board are members of the supervisory board. This raises the question whether the agreement should adopt a stricter definition or continue to promote hybrid structures (especially as some banks might want to adopt the European Company Statute).

(29) Internal discipline can be reinforced by the introduction of internal cost of capital allocation schemes, as they complement the weak external market discipline of conglomerates (Boot, 2000).

(30) See e.g. the Bouton White Paper in France, the Code on Corporate Governance of the Financial Reporting Council in the U.K., the Tabaksblat Report in the Netherlands or the OECD Corporat governance principles. In Belgium, the Corporate Governance Committee, established in January 2004 and chaired by Maurice Lippens, was set up at the initiative of the CBFA, the Federation of Belgian Enterprises and Euronext Brussels. The Committee has published a draft code on June 18, 2004. The Committee will publish the final version of the code on December 9, 2004, after a public consultation.

5. Conclusion

This paper has reviewed the corporate governance of banks and its implications for supervision. Banks are special, as banks' debt holders are dispersed non-experts, and this impairs the proper exercise of debt governance. In addition, banks are subject to potential risk shifting by shareholders. Therefore, bank depositors are in need of a representative. This role is generally endorsed by a regulatory and supervisory authority (RSA).

When managerial pay is not too sensitive to share prices, managerial control should reduce excessive risk taking. Under these conditions, the RSA may favour managerial control (requiring management autonomy). In addition, the RSA may find it advantageous to promote concentrated ownership, because of the potential to bail-in and the higher stability of ownership that is associated with concentration. In practice, however, managerial control and ownership concentration are difficult to combine.

The Belgian supervisory model is based on an instrument – the agreement on the autonomy of bank management – that tries to reconcile concentrated ownership with management autonomy. The initial goal of the agreement was to avoid conflicts of interest within group structures. It aimed at limiting the abuse of the banking function by holding companies to promote their own financial interests. Gradually, it also became an instrument to promote banking stability.

The agreement was last revised in 1992. In the meantime, changes have occurred in the financial and legal environment. On the legislative front, new developments have taken place in terms of both company law and banking law. Moreover, corporate governance codes have been introduced. While these initiatives overlap with some of the main ideas of the agreement, they are not a perfect substitute for its insistence on managerial autonomy or its desire to promote shareholder stability.

More challenging are the market developments that have led to a new banking landscape in Belgium, with increased foreign ownership, less stable shareholding structures and the rise of financial conglomerates that now control the main banks in Belgium. The conflicts of interests that were at the heart of the initial agreement, namely the granting of loans to troubled industrial shareholders of banks, are now largely irrelevant. On the other hand, banking stability concerns are possibly more important than ever, for two reasons. First, because the reduced stability of ownership makes potential bail-in (the second pillar of the agreement) problematic. And second, and more importantly, because the conglomerate structure of banking and insurance groups increases the potential conflicts between a centralised risk management at the holding level and the autonomy of bank management. Therefore, governance structures implemented by banks should remain a key issue in supervision.

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Appendix 1 – Historical perspective on the agreement on the autonomy of bank management in Belgium :

In Belgium, banking autonomy concerns were first raised early in the thirties during the mixed banks crisis. The *mixed banks* were shareholders of firms that they financed with the deposits they had raised. However, as they had been hit by the crisis that had started in 1929, these firms suddenly needed refinancing. At that time, mixed banks faced a clear conflict of interests. Indeed, they had to find a balance between the interests of their depositors and the interests of the companies they owned. The mixed banks decided to provide assistance to the ailing firms they owned. As depositors subsequently started to withdraw their deposits, the liquidity of mixed banks became a serious concern. Therefore, mixed banks were banned by a Royal Decree in 1934. The existing mixed banks were divided into holding companies and pure deposit banks.

This split, however, did not entirely solve the potential conflict of interests, as holding companies continued to exert their influence on the banks they were holding. Indeed, the holding companies were not only major shareholders of the new banks, but in many cases, boards of the two entities met together. In addition, in some cases, the holding company continued to intervene in lending decisions and sometimes was even informed of the bank's results before the board of directors of the bank. Therefore, the newly established CB drew attention to the autonomy of bank management on several occasions (see e.g. Annual Report 1936 and 1937).

In this context, the CB tried to negotiate with the Société Générale de Belgique (then shareholder of the Banque de la Société Générale de Belgique) and with Brufina (then shareholder of the Banque de Bruxelles), two holding companies, in order to decrease their participating interest in the credit institution they owned so as to limit it to 10 p.c. of the capital of the bank. In exchange for the forced disposal, the holding companies demanded exemption from taxation on the capital gains resulting from the sale. As this demand was rejected by the Ministry of Finance, the agreement was never applied.

The CB then approached the problem in a radically different way. Instead of trying to force holding companies to reduce their stake, in 1959 the Commission negotiated agreements with the holding companies in order to institutionalise their stakes in the bank. In other words, banks were no longer allowed to sell their stake without first consulting the CB. In addition, the agreement comprised three other clauses. First the chairman of the bank was no longer allowed to hold a position in the holding company and had to guarantee the independence of the bank. Second, individual members of the management committee no longer reported to the board of directors but to the managing board. This provision was supplemented by the introduction of the concept of the collective responsibility of the managing board. Third, the agreement revised the composition of the board of directors and included mandatory independent members.

In 1969, Brufina breached the agreement and sold a substantial share of its participating interest in the Banque de Bruxelles to Algemene Bank Nederland without informing the CB. This caused major political debates and fears of potential foreign control over Belgian banks. After lengthy discussions, the government agreed that the CB had to negotiate a new, stricter agreement that would apply in general to a large number of banks. In 1974, the agreement was extended to about 50 banks. The standard agreement was based on the two following pillars. First, the agreement implicitly set up a dual (two-tier) board system (the members of the managing board were chosen from among the members of the board of directors) in order to guarantee the independence of the management board. The managing board, in charge of the management of the bank, carried collegiate responsibility and its members were on equal footing. The board of directors was in charge of the definition of the general policy of the bank and of its supervision. With regard to its composition, neither the managers nor the representatives of significant shareholders were allowed to represent a majority of the directors. Second, the agreement recognised a quasi-institutional role for significant shareholders, which implied limitations on the transfer of ownership, in order to avoid the transmission of shares to an undesirable shareholder.

The content of the standard agreement was revised in 1992 for several reasons. First, a new regulatory context had emerged. The first (1977) and second (1988) Banking Co-ordination Directives incorporated some elements of the 1974 agreement such as the collegiality of the management board, the control of the status of shareholders, and the definition of sound and prudent policies. The Directives also gave formal legal power to the CB. Another change in the regulatory context was brought about by Basel I (1988), which obliged shareholders to strengthen the capital base if the regulatory

capital fell below a certain threshold. Second, certain developments in the banking sector highlighted the need for some revisions of the agreement. The increasing presence of foreign shareholders, as well as some limitations on the effective role played by the board of directors, forced the CBF to amend the 1974 agreement. Indeed, some shareholders were concerned about the fact that, in practice, the board of directors of most banks limited the scope of its intervention to a supervisory function. This problem threatened the stability of the shareholding structure as some shareholders would have incentives to dispose of their shares, since they were unable to effectively exert their responsibilities.

Although the spirit of the agreement remained unchanged, the agreement was therefore amended in 1992. The role of the board of directors and of its chairman was explicitly spelt out. The board of directors was in charge of the definition of the strategy, the plans and budgets, the structural reforms, and the definition of the relationship with the shareholders. In addition, the role of its chairman was to ensure the proper allocation of powers. The composition of the board of directors also changed, as limitations with regard to majority were abolished so that representatives of shareholders were allowed to cast a majority of the votes, increasing the power of major shareholders. The procedure for appointing the members of the managing board was also redefined and appointment required the approval of the CBF. With regard to major shareholders, their role and obligations remained unchanged, although their power increased.

Belgian SMEs and bank lending relationships

Hans Degryse, Nancy Masschelein and Janet Mitchell

1. Introduction

External funding is often required for firms to finance their investment projects. In many countries banks are the most important providers of external finance to firms. Belgium is a good example of such a country: a significant proportion of external finance is granted by banks operating in the Belgian financial sector. Domestic banks (or those with domestic operations) are especially important for small firms and business start-ups, as banks represent their main source of external capital. When credit is widely available to these firms, they can be an engine of growth in the economy. In this paper we address questions related to the determinants of firms' bank lending relationships, and we empirically investigate these determinants for small and medium-size Belgian firms (SMEs).

Why do firm-bank lending relationships arise?[1] Why do firms not borrow directly through financial markets? A natural explanation for the existence of firm-bank relationships is that banks serve as delegated monitors (Diamond, 1984) and are specialists in resolving asymmetric information problems (Ramakrishna and Thakor, 1984; Allen, 1990). Banks have expertise in screening loan applications to separate good from bad projects. Banks also learn about the quality of their borrowers over time, further allowing resolution of asymmetric information problems.

Bank finance also offers other advantages over market finance. First, a long-term lending relationship with a bank may offer a firm increased flexibility in the design of its credit contracts, allowing the firm to fulfil its more complex and non-standard credit needs. In addition, for a firm experiencing difficulty meeting contracted loan payments, the bank may help to smooth interest rates or to reschedule principal repayments through, for example, overdraft facilities. Banks also have the ability to exert control over firm management, which should induce managers to take optimal decisions[2]. All of these benefits help to explain why firms may value bank lending relationships.

Given the value of firm-bank relationships, how many bank lending relationships do firms maintain? Do firms maintain single or multiple lending relationships? A disadvantage of a single lending relationship is that the "inside" bank may be able to exploit its private information about the firm over time, raising interest rates and generating negative effects on the entrepreneur's incentives to invest (Sharpe, 1990; Rajan, 1992). Firms may therefore choose to maintain multiple bank relationships in order to avoid this "hold-up" problem (von Thadden, 1992). Another reason for firms to initiate multiple relationships is to minimize the probability of having their finance cut off (Detragiache et al., 2000). A final explanation for firms' multiple lending relationships is that banks themselves may require that certain firms (e.g., large exposures or financially distressed borrowers) spread their borrowing across other banks, in order to diversify the default risk.

(1) Firm-Bank relationships can be defined as the "close and continued interaction" between a firm and a bank that "may provide a lender with sufficient information about, and voice in, the firm's affairs" (Petersen and Rajan, 1995).

(2) See e.g. von Thadden (1995), Chemmanur and Fulghieri (1994), and Rajan (1992), respectively. The confidentiality of a bank relationship may also prevent leakage of proprietary information to product market competitors, Yosha, 1995), von Rheinbaben and Ruckes, 2004), and may encourage investment in research and development (Bhattacharya and Chiesa, 1995).

Financial intermediation theory and industrial organization theory suggest that the availability and cost of credit hinge on the structure of the banking market, and on the ways in which firms and banks interact with each other.[3] Changes in the structure of the banking sector which affect the availability and cost of bank credit can then ultimately shape economic growth and employment.[4] Thus, research on the effects of the structure of banking markets on bank finance has important policy implications.

In this paper we address the following questions. How many bank relationships do Belgian small and medium-size firms typically maintain? Which types of firms have multiple relationships? How does this compare with other countries? In Belgium, as in many other countries, banking sector concentration has increased over the last decade, in part due to a wave of bank mergers. The increase in concentration and its possible influence on competition in banking markets have potential implications for bank-firm lending relationships. Although we do not directly address the question of the impact of bank mergers on firm-bank lending relationships, we document structural changes in the Belgian banking sector, as well as changes over time in the number of lending relationships maintained by Belgian firms with banks operating in Belgium.[5]

The paper is organized as follows. In Section 2 we examine the structure of the Belgian banking sector and the number of bank lending relationships maintained by Belgian firms. In Section 3 we identify hypotheses that have been tested in the literature regarding the determinants of the number of firms' bank lending relationships. In Section 4 we test these hypotheses for small and medium-size Belgian firms. We conclude in Section 5.

2. Banking sector structure and the number of bank lending relationships

2.1 Data sources

Our investigation of firm-bank lending relationships draws on three sources of data:

- Data from the *credit register*, which contains information on loans to Belgian firms granted by banks operating in Belgium. Our data cover the period 1997-2002 and contain both authorised and utilised volumes by type of loan by bank. The banks represented in the data include all foreign and domestic banks operating in Belgium which either authorised or had outstanding loans during the period to non-financial firms. Loans to Belgian firms that were extended by foreign banks or branches outside of Belgium are not included in the data set. Also, the credit register contains no data on interest rates or collateral.
- *Firm balance sheets*. These data come from firms' annual balance sheet filings during the period 1994-2002. Small and medium-size firms in Belgium are allowed to file a short balance sheet form, which is less complete than the long form required for large firms. Hence, certain data such as sales and number of employees (for which reporting is voluntary on the short form) are not available for all firms.
- *Bank balance sheets*. These contain annual balance sheet data, which banks are required to report under the Supervisory Reporting Scheme (Schema A). These data are available from 1992-2003.

Belgium is one of several countries to maintain a public credit register. The general purpose of these credit registers is aptly described by Miller (2003): "most public credit registers are operated by the central bank or bank supervisor, and the financial institutions they supervise are compelled to participate by means of a law or regulation… This information is used in part of the supervision process as well as distributed back to the financial institutions who provided the data." (p. 37) This description also applies to the Belgian credit register. Banks granting loans to firms receive information back about their own clients and may also obtain information on new loan applicants. This information allows banks to determine the total amount of outstanding bank credit that firms already have and the number of other banks from whom firms are currently borrowing.

Our analysis of data from the credit register offers an illustration of the potential benefits that public credit registers can offer to authorities as well as banks. Such data allow regulatory authorities to better understand the lending behavior of banks and the role that bank finance plays for firms, including the degree to which firms might depend on a single bank lender. Relationship banking is an important feature of "bank-oriented" financial systems. For example, one of the often cited advantages of these systems, as compared with market-oriented systems, is that relationship banking permits early (out-of-bankruptcy)

(3) For financial intermediation theory, see e.g. Broecker (1990), Dell'Ariccia (2001), Petersen and Rajan (1995) or Cao and Shi (2001). The different theories presented by these papers, however, generate ambiguous predictions about the effect of bank market structure on access to external finance. For an overview of industrial organization theories relating to the banking market, see Tirole (1988) or Freixas and Rochet (1997).

(4) Two types of empirical approaches to investigate these issues can be distinguished. Empirical work using micro-data has looked at the impact of bank competition on firm creation (see e.g. Bonaccorsi di Pati and Dell'Ariccia, 2003, or Black and Strahan, 2002). Other work uses cross-country data to investigate the impact of bank competition on access to finance (see e.g. Beck, Demirgüç-Kunt and Maksimovic, 2003).

(5) In a companion working paper (Degryse, Masschelein, and Mitchell, 2004) we take up the question of the effects of bank mergers in Belgium on firms' bank lending relationships.

restructuring of firms in distress, thereby lowering the risk of inefficient firm liquidation, as well as potentially raising recovery rates on bank loans.

While the credit register data offer a unique source of information relating to firms' bank lending relationships and loan volumes, the limitations of these data nevertheless suggest some restrictions and caveats for our investigation. Most importantly, because the credit register data include only banks operating on Belgian territory and thus exclude foreign banks operating outside of Belgium, it is possible that the average number of bank relationships for large firms is understated in these data. If large Belgian firms borrow from foreign banks that are not located in Belgium, then those relationships will not be captured in the data. This suggests restricting our attention to small and medium size firms. We therefore exclude large firms from all of the regression analysis reported in Section 4 below.[6]

The credit register data include information on authorised loan volumes and on actual borrowing (utilised loan volumes). This paper analyses utilised loan volumes, on the assumption that bank lending relationships are more likely to be valuable to firms and banks to the extent that lending actually occurs.

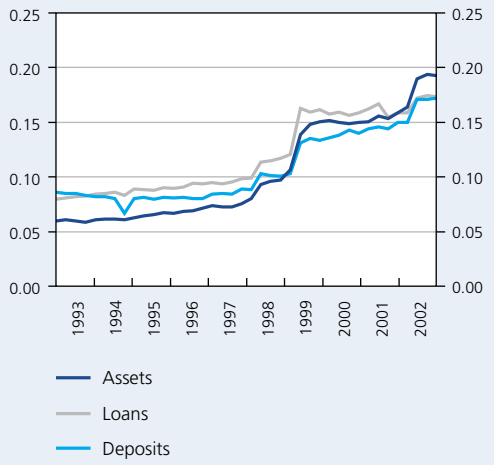
2.2 Banking sector structure

Concentration in the Belgian banking sector has steadily increased over the past decade and is currently quite high. A small number of large banks now accounts for a high percentage of banking sector assets, deposits, and loans. Table 1 documents a decline over time in the number of banks operating in Belgium in all bank size categories, as well as the current small number of large banks. The decline in the number of banks is due in part to several mergers and acquisition that have occurred over the past decade. Indeed, every large bank currently operating in the Belgian banking sector has been involved in some type of merger or acquisition in the past ten years.

Chart 1, which depicts Herfindahl indices over time for assets, deposits, and loans in the Belgian banking sector, illustrates the increase in concentration that has occurred in each of these areas.

Table 2 reports another measure of concentration: the four-bank concentration ratio of loans to firms. These four-bank market shares are reported for all firms and by Basel II firm size category (corporates, corporate SMEs and retail SMEs).[7] Table 2 reveals that the four largest banks have accounted for a high and increasing

CHART 1 HERFINDAHL INDEX FOR BELGIAN BANKING SECTOR [1]



Source : NBB.

(1) The Herfindahl index is equal to the sum of the squares of the market shares of each bank for loans, deposits and assets respectively. The index has been computed on a monthly basis over the period from December 1992 to December 2002.

proportion of total loans to firms throughout the 1997-2002 period.[8] The shares of loans by these banks to SMEs is currently very high.

The decrease over time in the number of banks operating in Belgium and the increase in concentration suggest that small and medium-size firms, which typically borrow from domestically operating banks, may have experienced a decline in the number of banks with which they maintain lending relationships. On the other hand, any decline in the average number of firms' bank lending relationships would also likely depend on the initial number of relationships, as well as on the degree to which SMEs rely on large banks for their loans. The theoretical and empirical banking literature suggests that small banks have a comparative advantage in lending to small firms and indeed specialise in lending to SMEs. Table 2, however, suggests that large banks are very important in lending to all size categories of Belgian firms.

(6) The Belgian economy has a large number of coordination centers. These are generally subsidiaries of international firms that have been established in Belgium to benefit from tax advantages. They carry out activities for other group entities such as centralisation of accounting, administration, and financial transactions. Because coordination centers do not behave like typical firms, they have also been excluded from our regression analysis.

(7) Corporates are defined in the Basel II accord as firms with greater than 50 million euro in annual sales; SMEs have sales below 50 million euro. (Subject to national discretion, the Basel Committee allows substituting the value of assets for sales when the latter is unavailable.) In addition, retail SMEs are those SMEs for which the total exposure of any single banking group to the firm is less than 1 million euro.

(8) The lower market share of loans by the four largest banks for corporates than for smaller firms is explained by the fact that large foreign banks with branches in Belgium are responsible for a significant proportion of loans to corporates. These foreign banks are not among the four largest banks in the Belgian banking sector.

TABLE 1 NUMBER AND SIZE DISTRIBUTION OF BANKS OPERATING IN BELGIUM (1)

	1993	1996	1999	2002
Small	72	69	59	56
Medium	63	58	49	48
Large	15	13	9	6
Total	**150**	**140**	**117**	**110**

Source : NBB (Schema A).
(1) Large banks are defined as having assets exceeding 10 billion euro in 2002 values; medium banks have assets between 500 million and 10 billion euro.

2.3 Firms' bank lending relationships

Table 3 presents summary statistics on the number of bank lending relationships maintained by Belgian firms in 1997 and in 2002.[9] This table presents statistics for all firms, as well as for Basel II size categories. Several features of the table stand out. First, the average number of bank lending relationships for all firms taken together is low. Second, the average number of relationships is significantly higher for large firms than for small firms. Finally, the average number of bank lending relationships for firms in all size categories has declined over time, although the decline is more noticeable for large and medium size firms than for very small firms, which have a small mean number of lending relationships to begin with.[10]

Table 4 provides detail with respect to the percentages of Belgian firms with differing numbers of lending relationships. Table 5 reports the percentages of total utilised loan volumes accounted for by firms with differing numbers of relationships. As seen in Table 4, the percentage of firms with single bank lending relationships is high (although this observation appears roughly consistent with similar observations for SMEs across countries).[11] This table also reveals that the decline in the average number of bank relationships over time has translated into an increasing proportion of firms with a single bank relationship and a declining proportion of firms with multiple relationships. Table 5 shows an increase over time in the proportion of total utilised credit accounted for by firms with single relationships.

In the following sections we identify determinants of multiple versus single bank lending relationships that have been suggested in the literature and tested for other countries, and we test them for Belgium. In addition, since

(9) The total numbers of observations in this table are greater than in the tables of Section 4, as large firms (corporates) are excluded from the regression analysis of that section.

(10) Although data are presented for only two years, data for the intermediate years confirm a steady decline in the average number of lending relationships across all size categories of firms.

(11) For example, results for France indicate that about 60 p.c. of firms having sales of less than 2.5 million euro have one bank lending relationship (Dietsch and Golitin-Boubakari, 2002, credit register data for 2000). In Portugal, about 57 p.c. of firms have a unique relationship (Farinha and Santos, 2000, credit register data for 1995).

TABLE 2 MARKET SHARES OF THE FOUR LARGEST BANKS IN LOANS TO FIRMS BY FIRM SIZE CATEGORY (1)
(Percentages)

	December					
	1997	1998	1999	2000	2001	2002
Corporate	49.9	55.4	68.00	71.3	69.3	81.5
Corporate SME	54.4	64.3	79.5	76.2	80.5	85.2
Retail SME	71.4	78.3	84.9	84.2	84.3	86.7
Total	**58.0**	**66.4**	**78.5**	**77.2**	**79.0**	**83.5**

Source : NBB (Credit Register).
(1) Size category definitions correspond to those specified for the Basel II accord. (See footnote 7.)

TABLE 3 NUMBERS OF FIRMS AND NUMBERS OF BANK RELATIONSHIPS BY BASEL II SIZE CATEGORY
(December)

	Number	Mean	Median	Min.	Max.	Std. dev.
1997						
Total	100,432	1.30	1	1	16	0.70
Corporate	904	3.31	3	1	15	2.44
Corporate SME	5,397	2.02	2	1	16	1.29
Retail SME	94,131	1.24	1	1	7	0.54
2002						
Total	124,483	1.22	1	1	13	0.54
Corporate	1,070	2.41	2	1	13	1.55
Corporate SME	5,904	1.73	1	1	8	0.95
Retail SME	117,509	1.18	1	1	6	0.46

Source : NBB (Credit Register).

we observe a decline of the number of bank lending relationships over time in Belgium, we investigate whether the impact of these determinants has remained stable over time. If changes in firm characteristics or changes in the determinants of the number of bank lending relationships cannot explain the decline in the number of lending relationships, we may suspect that structural changes in the banking sector are at play.

3. Determinants of the number of firm-bank relationships

The question of whether firms will maintain single or multiple bank lending relationships has been a subject of both theoretical and empirical interest in the financial economics literature. In this section we identify some hypotheses that have been proposed and tested for other countries. Table 6 provides a selective summary of the empirical results obtained for other countries in relation to these hypotheses.

TABLE 4 PERCENTAGES OF FIRMS BY NUMBER OF RELATIONSHIPS
(December of each year)

Numbers of relationships	Percentages of Debtors					
	1997	1998	1999	2000	2001	2002
1	78.4	78.4	79.4	80.4	81.8	82.5
2	16.3	15.7	15.3	15.2	14.5	14.1
3	3.7	3.5	3.2	3.2	2.9	2.7
4	1.1	0.9	0.7	0.7	0.6	0.5
5	0.3	0.3	0.2	0.2	0.2	0.1
More than 5	0.3	0.2	0.1	0.1	0.1	0.0

Source : NBB.

TABLE 5 PERCENTAGES OF TOTAL EXPOSURES ACCOUNTED FOR BY FIRMS WITH DIFFERING NUMBERS OF RELATIONSHIPS
(December of each year)

Numbers of relationships	Percentages of Exposures					
	1997	1998	1999	2000	2001	2002
1	38.1	38.4	39.5	39.6	43.4	44.5
2	19.8	19.8	22.7	21.9	22.6	24.1
3	11.7	11.4	11.5	13.8	12.7	11.1
4	8.4	9.6	9.1	9.3	7.0	7.0
5	5.7	4.7	4.0	3.5	3.8	5.1
More than 5	16.3	16.2	13.4	12.0	10.6	8.2

Source : NBB.

HYPOTHESIS 1 :
"INFORMATIONALLY OPAQUE" FIRMS (YOUNGER AND SMALLER FIRMS) MAINTAIN FEWER RELATIONSHIPS.

When costly information asymmetries exist between investors and project insiders, a single bank may arise as the optimal mechanism for channelling loans from investors to firms (Diamond, 1984). Indeed, such delegated monitoring avoids both duplication of monitoring and free riding of some investors on the monitoring efforts of others, and results in cheaper financing for the firm.

Information asymmetries are most important for informationally opaque firms. One category of firms that are informationally opaque is young firms, due to the fact that banks do not have much information about these firms, and little information is likely to be publicly available (see Petersen and Rajan, 1995 and Farinha and Santos, 2002). Another proxy for informational opacity is firm size. Smaller firms are considered to be more opaque, as these firms often have less strict reporting requirements and as fewer analysts are likely to follow the firms (see Detragiache et al., 2000). In addition, small firms may have only a small amount of collateral to pledge, or a bank lender may require all available assets as collateral for a loan, which would limit the option for such firms to initiate multiple lending relationships (see e.g. Degryse and Van Cayseele, 2000 or Machauer and Weber, 1998).

HYPOTHESIS 2 :
FIRMS WITH A HIGH PROBABILITY OF FINANCING DENIED (LESS PROFITABLE OR FINANCIALLY DISTRESSED FIRMS AND FIRMS WITH DISTRESSED OR ILLIQUID BANKS) WILL CHOOSE TO HAVE MULTIPLE RELATIONSHIPS.

Less profitable firms may initiate multiple bank relationships in order to increase the likelihood that at least one bank will obtain a positive signal about the firm's quality and continue granting finance. Along different lines, Detragiache et al. (2000) argue that firms may be vulnerable to a liquidity shock experienced by their bank. Firms may need to discontinue their investment projects if they are unable to obtain additional financing because the lender has encountered liquidity problems. In order to reduce this "liquidity risk" firms may have the incentive to initiate multiple bank relationships, as the likelihood that all informed banks would be hit by a liquidity shock is lower than the likelihood that a single bank lender would be hit.(12)

HYPOTHESIS 3 :
BANKS MAY REQUIRE CERTAIN FIRMS (VERY LARGE OR LESS PROFITABLE FIRMS) TO HAVE MULTIPLE RELATIONSHIPS.

One reason that firms have multiple bank relationships may be the desire by banks themselves to diversify risk (bank-diversification hypothesis). This may happen for two reasons. First, risk-diversification objectives give banks incentives to share the risk of lower quality firms with other banks (Harhoff and Körting, 1998 : Farinha and Santos, 2000). A bank may accomplish this through limiting its

(12) Although we cite this argument for the sake of completeness, we do not believe that the risk of bank liquidity shocks plays a significant role in determining the number of bank lending relationships for Belgian firms. Banks in Belgium have historically held large stocks of liquid assets, due to their substantial portfolios of government bonds. Thus, we do not include bank characteristics in the regressions reported in Section 4.

TABLE 6 RESULTS OF EMPIRICAL TESTS OF THE DETERMINANTS OF THE NUMBER OF BANK-LENDING RELATIONSHIPS (1)

(The dependent variable is the probability of having more than one bank relationship, except for Germany where the dependent variable is the number of relationships. Positive signs indicate a higher number of relationships.)

Country	Italy	France	Germany	Japan	US
Sample Year(s)	1994	1993-2000	1992-1996	1982-1999	1998
Firm Characteristics					
Hypothesis 1					
Age	0				++
Size	+++	+++	+++	0	+++
Intangibles / High Tech	0			++	
Hypothesis 2/3					
Profitability	– –	– – –		0	
Risk or Distressed firms		+++	0		
Other firm characteristics (2)	Yes	Yes	Yes	Yes	Yes
Bank Characteristics					
Hypothesis 2					
Variability Liquidity	– –				
Nonperforming Loans	–				
Other bank characteristics (3)	Yes	No	No	No	Yes
Firm-bank interaction characteristics	*No*	*No*	*Yes*	*Yes*	*No*

Sources : Detragiache, Garello and Guiso (2000) for Italy; Dietsch and Golitin-Boubakari (2002) for France; Machauer and Weber (2000) for Germany; Sterken and Tokutsu (2003) for Japan; and Berger, Miller, Petersen, Rajan, and Stein (2004, Table 6, logit specification) for the US.

(1) +++ denotes positive and significant at 1 p.c., ++ at 5 p.c., + at 10 p.c. levels, respectively. ––– denotes negative and significant at 1 p.c., –– at 5 p.c., – at 10 p.c. levels, respectively. 0 denotes that variable was included in the specifications but was not significant.

(2) Other firm characteristics include variables such as membership in a group and available cash flow.

(3) Other bank characteristics include variables such as bank age, recovery rate on bank loans, and liquidity shocks.

exposure to poor credit quality firms, i.e. less profitable firms (see e.g. Petersen and Rajan, 1995). Second, banks may attempt to reduce their concentration risk by requiring firms with very large borrowing needs to establish additional bank lending relationships.(13)

Our analysis of Belgian firms in Section 4 concentrates on Hypotheses 1 and 2, although our regressions also implicitly test the implications of Hypothesis 3 with respect to firm profitability. Both Hypotheses 2 and 3 imply that less profitable firms will have multiple bank relationships; however, Hypothesis 2 suggests that the motivation for these multiple relationships comes from borrowers, whereas Hypothesis 3 suggests that the motivation for this result comes from lenders who require borrowers – as a condition for granting a loan – to secure a portion of their external finance from other lenders.

Table 6 summarises some of the empirical results relating to Hypotheses 1-3 obtained in studies for other countries. The results reported in the table offer some support for each of the three hypotheses.

In addition to the within-country studies reported in Table 6, a few studies have attempted to identify country-specific differences in the number of firms' bank lending relationships. Only tentative conclusions can be drawn from these studies, however, as they are based on very small sample sizes. Ongena and Smith (2000) report findings from a cross-country study containing 20 countries. They find that firms in countries with stable and unconcentrated banking systems maintain more bank lending relationships, while firms in countries with strong judicial systems and stronger creditor protection maintain fewer relationships. Volpin (2000) provides some additional support for these findings, reporting a negative relationship between the number of bank relationships maintained by firms and the degree of shareholder legal protection.

(13) Other types of arguments have also been applied to the issue of the number of bank relationships. For example, Bolton and Scharfstein (1996) and Dewatripont and Maskin (1995) argue that firms may establish multiple lending relationships in order to pre-commit to "good" behaviour, knowing that loan renegotiation is more difficult with several lenders rather than a single lender. On the other hand, Carletti (2004) argues that the existence of multiple lenders may give each individual bank less incentive to monitor the firm. Less monitoring leads to inefficiency, and firm managers may be able to get by with less "good" behaviour with multiple lenders.

TABLE 7 SME CHARACTERISTICS: CONTINUOUS VARIABLES

	Number	Mean	Median	Std. dev.	25 percentile	75 percentile
1997						
AGE (1)	99,528	9.23	9.17	2.14	5.78	15.33
ASSET (2)	99,528	1,586	414	8,553	194	984
ROA (3)	99,528	5.2	5.1	11.2	1.0	10.0
LEVERAGE (3)	99,528	76.7	77.0	39.0	57.9	90.4
2002						
AGE (1)	123,413	10.21	11.44	2.17	6.16	16.94
ASSET (2)	123,413	1,669	414	9,935	199	980
ROA (3)	123,413	5.6	4.8	11.5	0.1	9.7
LEVERAGE (3)	123,413	76.2	76.4	38.7	57.3	90.3

(1) In years.
(2) In thousands of euro (2002 values).
(3) In percentages.

4. Determinants of bank lending relationships for Belgian SMEs

In this section we test Hypotheses 1-3 for Belgian SMEs for the years 1997 and 2002. In addition to identifying the variables which influence whether firms maintain single versus multiple lending relationships, we are also interested in investigating the extent to which the effects of these variables have remained stable over time.

TABLE 8 FIRM CHARACTERISTICS: DISCRETE VARIABLES

(Number of firms in each category; percentages in parentheses)

	1997	2002
NEGEQ = 0	86,962 (87.4)	109,018 (88.3)
NEGEQ = 1	12,566 (12.6)	14,395 (11.7)
RECBALANCE = 0	6,694 (6.7)	7,956 (6.4)
RECBALANCE = 1	92,834 (93.3)	115,457 (93.6)
YOUNG = 0	94,952 (95.4)	116,321 (94.3)
YOUNG = 1	4,576 (4.6)	7,092 (5.7)

4.1 Descriptive statistics

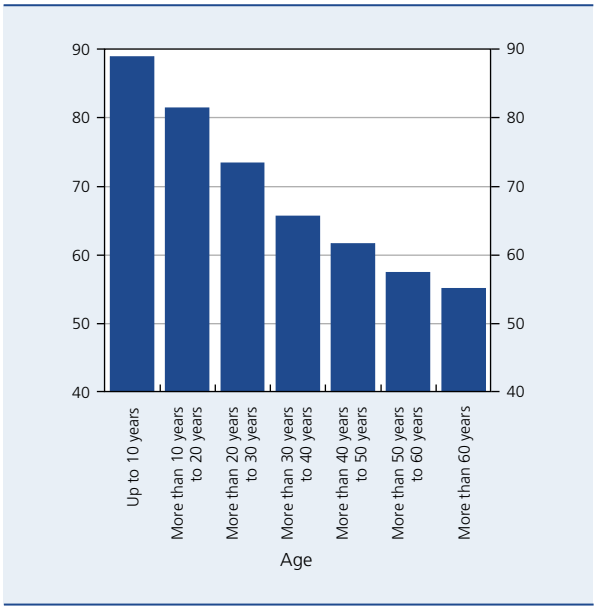
Table 7 provides summary statistics for characteristics of the firms in our sample[14]: age (AGE), return on assets (ROA), ratio of debt/assets (LEVERAGE), and firm size (ASSET). Although the firms in our sample are slightly older in 2002 than in 1997, firm size, return on assets and leverage are similar in the two years.[15]

Table 8 provides statistics relating to several discrete (dummy) variables that are likely to be important in determining the number of bank lending relationships. The first of these variables indicates whether the firm has negative equity; i.e., debt exceeding assets (NEGEQ). We interpret a value of debt exceeding assets (NEGEQ = 1) as a sign of financial distress for a firm. A second variable indicates whether the firm has filed a balance sheet in either of the two years preceding the given year (RECBALANCE). We suspect that halting the filing of balance sheets is one of the stages that firms may go through on the way to "exit", either via bankruptcy or voluntary liquidation. Finally, the variable YOUNG indicates whether the firm has only filed a balance sheet covering less than 12 months of data. Firms in this category (YOUNG = 1) are indeed young and have not yet filed a balance sheet covering a full year of data. Table 8 shows that the proportions of firms in the categories represented by all three of these variables have remained stable between 1997 and 2002.

(14) We have excluded from our sample all firms meeting the Basel II definition of "corporate", all firms with assets exceeding 500 million euro (in 2002 values), and all coordination centers.

(15) We have excluded from our analysis some firms with "outlier" values for some of the variables.

CHART 2 PERCENTAGE OF FIRMS WITH SINGLE BANK LENDING RELATIONSHIP BY AGE CATEGORY



Source : NBB.

It is possible to gain some idea of the degree to which our data support Hypotheses 1-3 by examining correlations between differing firm characteristics and the number of bank lending relationships maintained by firms. An indication of the positive relationship between firm size and the number of lending relationships has already been provided by Table 3 in Section 2. As illustrated by Chart 2 below, which shows the percentage of firms with single bank lending relationships by age category, our data also appear to support the conjectured positive relationship between firm age and number of lending relationships.

On the other hand, our data relating to firm profitability and the number of relationships do not appear to be entirely consistent with the conjectures of Hypotheses 2 and 3. In particular, rather than the conjectured negative relationship between firm profitability and the number of lending relationships, our data suggest a nonlinear (inverse U-shape) relationship, with very low profitability and very high profitability firms tending towards single bank relationships while firms with medium levels of profitability maintain multiple relationships (Chart 3, discussed below, illustrates our regression results relating to firm profitability and the probability of having multiple bank relationships).

4.2 Regression analysis

We use logit regressions to test the determinants of single versus multiple bank lending relationships for Belgian SMEs in 1997 and 2002. The dependent variable in the regression takes on a value of 1 if the firm has multiple bank lending relationships and 0 if the firm has a single bank relationship. The logit regression tests whether the independent variables have a statistically significant impact on the estimated probability that a firm will have multiple lending relationships. Variables for which the coefficients have positive signs (and are statistically significant) positively affect the probability that a firm has multiple relationships. Variables with negative signs negatively affect this probability.

Table 9 presents the results of the logit regressions. All of the variables included in these regressions, with the exception of the intercept term for 1997, are significant at the 1 p.c. level. Although not reported, industry dummies have been included in both regressions. Table 9 reveals that the signs and the coefficient values of the independent variables are stable across the two years.

The positive signs on the regression coefficients of firm age (AGE) and size (log ASSET) in Table 9 offer support for Hypothesis 1 : there exists a positive and statistically significant relationship between firm age and the probability of maintaining multiple bank relationships, as well as between firm size and the probability of maintaining

TABLE 9 LOGIT REGRESSIONS : SINGLE VERSUS MULTIPLE LENDING RELATIONSHIPS

(Dependent variable = 1 if multiple relationships, 0 if single relationship (1))

	1997	2002
Intercept	–12.05	–12.47
LOG(AGE)	0.34	0.37
LOG(ASSET)	0.67	0.64
ROA	0.58	0.40
ROA squared	–0.63	–0.92
LEVERAGE	1.11	1.02
LEVERAGE*NEGEQ	–0.70	–0.66
RECBALANCE	0.15	0.52
YOUNG	–0.23	–0.30
Number	99,528	123,413
Pseudo R^2	22.92	20.93

(1) All independent variables, with the exception of the intercept term in 1997 are significant at the 1 p.c. level.

multiple relationships. In addition, controlling for AGE (and other variables), young firms with balance sheets covering less than 12 months (YOUNG) are less likely to have multiple relationships than are firms that have filed a full-year balance sheet.

While the coefficients on these variables are statistically significant, it is also necessary to check for economic significance. We do this by calculating the marginal probabilities of having multiple lending relationships associated with different values of the independent variables. The marginal probabilities are obtained by substituting the regression coefficients into the log function and varying the values of the independent variables of interest. The marginal probabilities calculated in this way for the variable AGE suggest that the effect of firm age alone is not very important. For the 2002 regression, an increase in firm age from its mean value of 9 years to the 75th percentile value of 15 years, holding all other variables at their mean values, would cause the probability of having multiple relationships to rise by less than 0.5 p.c. above the sample average of 17 p.c. On the other hand, young firms with balance sheets covering less than 12 months of data (YOUNG) are very unlikely to have multiple relationships. The estimated change in probability of multiple relationships for firms with YOUNG = 1 relative to firms with YOUNG = 0 is –4.2 p.c.

As expected, firm size appears to be economically significant in determining whether firms have multiple lending relationships. An increase in firm size from its mean to its 75th percentile value would cause the estimated probability of having multiple relationships to increase from 17 p.c. to 23 p.c.

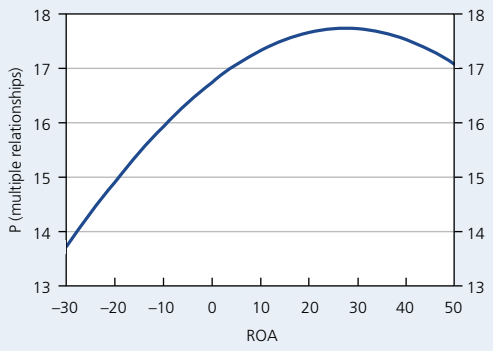
The regressions also confirm a divergence of our results from the conjectures of Hypotheses 2 and 3 regarding the relationship between firm profitability and the number of bank lending relationships (ROA and ROA squared). Chart 3 illustrates the estimated probabilities of multiple lending relationships for different values of ROA (probabilities are calculated using the sum of the coefficients ROA + ROA squared). This chart shows that low profitability or loss-making firms are less likely to have multiple relationships than are more profitable firms.[16] This suggests that although low profitability firms may wish to have multiple lending relationships (Hypothesis 2), new lenders may simply be unwilling to extend loans to these firms. As profitability increases from low levels, the likelihood of having multiple relationships rises.

The positive coefficient on LEVERAGE in each of the regressions reported in Table 9 indicates that firms with greater leverage have a higher probability of having multiple relationships than those with lower leverage. However, the negative sign on the interaction term LEVERAGE*NEGEQ suggests that increases in leverage for very highly leveraged firms lower the probability of multiple relationships. Indeed, for the 2002 regression the average estimated change in probability of multiple relationships for firms with debt greater than assets (NEGEQ = 1) is –9.3 p.c. This result provides additional evidence in support of the idea that financially distressed firms are less likely to have multiple lending relationships.

A final result which also offers indirect evidence concerning the potential difficulty for financially distressed firms to maintain multiple lending relationships is the positive regression coefficient on the variable RECBALANCE. This coefficient indicates that firms which have filed a balance sheet in either of the two years preceding the year of observation are more likely to have multiple relationships than are firms that have not filed a recent balance sheet. The estimated decrease in the probability of multiple relationships for firms that have not filed a recent balance sheet (RECBALANCE = 0) relative to those which have filed a balance sheet is 7.2 p.c.

In summary, some of our findings for Belgian SMEs are in line with the hypotheses tested in the literature ; however, some results differ. Consistent with the literature, we find that younger and smaller firms tend to have fewer lending

CHART 3 ESTIMATED PROBABILITY OF HAVING MULTIPLE LENDING RELATIONSHIPS FOR DIFFERING VALUES OF ROA (1)



Source : NBB.

(1) Return on Asset values in the chart range from the 1st to the 99th percentiles of firms in the sample.
The probabilities for ROA are computed using the coefficients of ROA + ROA squared and holding all other independent variables at their mean values.

(16) Although very high profitability firms also have a slightly lower probability of having multiple relationships than do some firms with lower profitability, this effect is not as strong as that for very low profitability firms.

relationships. In contrast with the literature, however, we find that very low profitability firms or firms in financial distress are less likely to have multiple relationships.

5. Conclusion

This paper has analysed the determinants of firm-bank lending relationships for small and medium-size firms in Belgium. Using data from the Belgian credit register, we investigate a number of hypotheses that have been proposed and tested in the financial economics literature. In accordance with results obtained for other countries, we find that smaller and younger firms maintain fewer lending relationships. This observation is in line with the hypothesis that more informationally opaque firms maintain fewer lending relationships. Unlike results obtained for other countries, we find that firms with low profitability or financially distressed firms have fewer lending relationships. This result contrasts with the hypothesis that low profitability firms choose to have multiple lending relationships in order to reduce the probability of having their finance cut off. Our results suggest that whereas low profitability firms might like to have multiple bank lending relationships, lenders may refuse to lend to such firms.

We have also observed that the average number of bank lending relationships maintained by Belgian firms is relatively low. This average has declined over time for firms in all size classes. One potential explanation for this decline is that firm characteristics or the determinants of the number of bank lending relationships have changed over time. We find no strong evidence in support of this explanation. Firm characteristics and determinants have remained quite stable over our time period. This suggests that structural changes in the Belgian financial sector may have contributed to the declining average numbers of bank lending relationships.

In addition to allowing a comparison of the determinants of bank lending relationships for Belgian firms with results from other countries, our analysis helps to illustrate some of the benefits that public credit registers can present for public authorities. Analysis of credit register data permit authorities to better understand bank behaviour and the forces driving loan markets. Such information can be useful for determining the quality of bank loans, especially if the credit register contains information on interest rates and collateral provided by the firm to the bank, or a standardised measure of firm quality such as a credit score. The centralisation of such information can thus provide benefits to banks and authorities alike.

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The Determinants of Credit Spreads

Astrid Van Landschoot

1. Introduction

While many studies concentrate on theoretical models for the pricing of corporate bonds and credit risk, there has been much less empirical testing of these models. Yet, there are several reasons for investigating the determinants and behaviour of credit spreads. First, both the US and Euro corporate bond markets have grown rapidly in recent years. The Euro market, which lags its US counterpart, has become broader and more liquid, and the number and the market value of Euro corporate bonds have more than doubled over the last five years.

These developments have potentially affected financial stability. The growth of the corporate bond markets has significantly influenced the composition of portfolios held by financial institutions, industrial firms, trusts, and private investors. It is likely that the portfolios of these investors have become more (geographically) diversified. Investors can also construct portfolios that better fit their needs and expectations of return and risk, which will improve the allocation of capital. On the other hand, the increased reliance by corporates and households on financial market instruments such as corporate bonds has also increased the dependence of these investors and borrowers on financial market prices.

A second reason for studying the determinants of credit spreads is that the credit derivatives market, including structured finance products such as collateralized debt obligations (CDO) and asset-backed securities (ABS), has experienced considerable growth over the last two decades and is expected to grow strongly in the coming years. Some structured products such as collateralized bond obligations (CBO) are backed by a large pool of corporate bonds. This implies that the cash flows (coupon and principal) of the underlying bonds determine the profitability of these structured products; therefore, the creditworthiness of corporate bonds is important for the analysis of these products.

Finally, central bankers use credit spreads to assess (extract) default probabilities of firms and to assess the general functioning of financial markets (credit rationing and sectoral versus macroeconomic effects). In addition, the credit spread is often used as a business cycle indicator. Having a better understanding of credit spreads will help central bankers to extract more precise information from bond prices/spreads.

The contributions of this article are threefold. First, we present an empirical analysis of the determinants of credit spread changes on Euro corporate bonds between 1998 and 2002. This is one of the first analyses of the determinants for different types of Euro corporate bonds based on rating and maturity. In choosing the determinants, we are led by the structural credit risk models pioneered by Black and Scholes (1973) and Merton (1974). Our results show that factors suggested by the structural credit risk models, such as the level and the slope of the default-free term structure, the stock price, and the stock price volatility significantly affect credit spreads on Euro corporate bonds. An important result is that the sensitivities of credit spreads strongly depend on the rating and the maturity of the bonds. Furthermore, liquidity risk is an important determinant of credit spreads, especially those on lower rated bonds. Second, we compare the sensitivities of credit spreads on US and European corporate bonds to financial and macro-economic variables. A review of the existing literature on US and European credit spreads shows that no more than 45 p.c. of the dynamics of credit spreads can be explained. Furthermore, although the US and the European corporate bond markets differ significantly in terms of market value and number of bonds, empirical

results for bond markets in both regions are very similar; i.e. the impact of financial and macro-economic news on credit spreads is similar in the US and in Europe. We find that credit spread changes depend more on bond characteristics such as rating and maturity than on country or currency of issuance.

Several possible explanations have been put forward to explain the gap between observed credit spreads and estimated spreads from existing empirical models. These explanations include liquidity risk, taxation, systematic shocks, and diversification risk (see Collin-Dufresne et al. (2001), Elton et al. (2001), Delianedis and Geske (2002), Driessen (2003), Houweling et al. (2004), D'Amato and Remolona (2003), Van Landschoot (2004), and Perraudin and Taylor (2004)). Although there is no consensus on the relative importance of each of these factors, most studies conclude that liquidity risk and systematic shocks significantly influence credit spread changes. D'Amato and Remolona (2003) are the first to suggest that the unexplained portion of the dynamics of credit spreads is actually a premium for diversification risk. According to these authors, investors would need a much larger number of bonds in order to have a well-diversified portfolio than the number of stocks necessary for diversification.

Along these lines, a third contribution of this article is a comparison of the simulated loss distributions of bond, stock, and mixed (made up of bonds and stocks) portfolios. Our simulations suggest that the distribution of bond portfolios is more skewed to the left than is the distribution of equity portfolios for the same firms. This suggests that an investor may well need more bonds than stocks in order to have a well-diversified portfolio. However, the skewness of mixed portfolios is very similar to that of stock portfolios. This calls into question the importance of skewness of the distribution of bond portfolios for large investors, such as financial institutions with large portfolios of bonds and stocks. Furthermore, this analysis does not give any indication of the importance of diversification risk as compared with other factors discussed in the literature such as liquidity risk and systematic shocks.

The remainder of this article is organized as follows. Section 2 gives an overview of the developments in the US and Euro corporate bond markets and briefly discusses some well-known measures of credit risk. In Section 3, we discuss the theoretical determinants of credit risk, i.e. the determinants that follow from structural credit risk models. Section 4 reports the results of an empirical analysis of the determinants of Euro credit spreads for bonds with different ratings and maturity (1998-2003). Section 5 reviews the empirical literature and compares results for European and US credit spreads. In Section 6, we discuss other potential factors that could influence credit spreads and present the (simulated) loss distributions of hypothetical portfolios of stocks and bonds. Section 7 concludes.

2. Corporate Bond Market

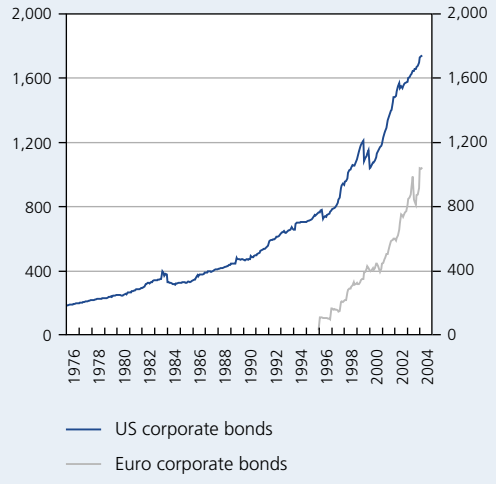
2.1 Market Developments

Before discussing some measures of credit risk and the determinants of credit risk, we briefly describe developments in the Euro and US corporate bond markets over the last three decades.[1] These developments explain why the US corporate bond market has been studied much more than the Euro corporate bond market (see Section 4.2).

Chart 1 presents the outstanding amounts of US and Euro investment grade corporate bonds.[2] While the US investment grade corporate bond market had an average outstanding amount of 200 billion dollars in the 1970s, the Euro corporate bond market did not exist. Over the

CHART 1 OUTSTANDING AMOUNT OF INVESTMENT GRADE US AND EURO CORPORATE BONDS

(Billions of US dollars)



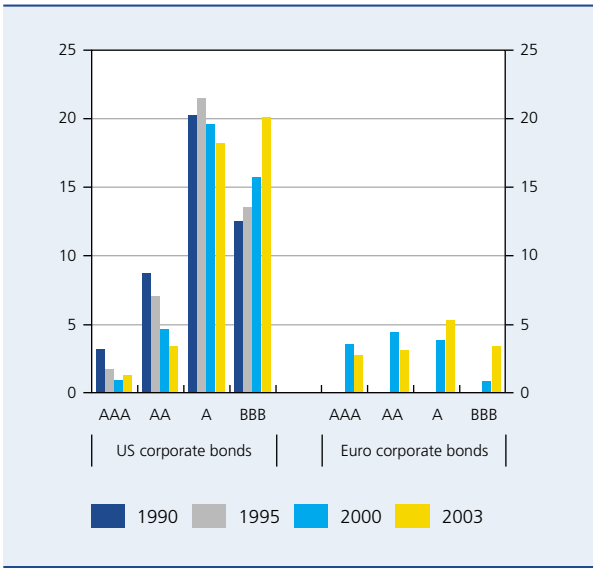
Source : Bloomberg (Merrill Lynch).

(1) In what follows, the Euro corporate bond market is defined as Euro-denominated bonds issued by EMU countries.

(2) Chart 1 presents the outstanding amount of the Merrill Lynch US and Euro corporate bond index. See Section 4.2 for a more detailed discussion of the data. Although the US and Euro high yield corporate bond markets are much smaller than their investment grade counterparts (between 15 and 30 p.c.), they show a similar evolution. In what follows, we will focus on the investment grade markets.

CHART 2 AVERAGE MONTHLY NUMBER OF US AND EURO CORPORATE BONDS ISSUED

(Thousands of unit)



Source : Bloomberg (Merrill Lynch).

last decade the outstanding amounts of both markets have sharply increased. In January 2004, however, the outstanding amount of the US corporate bond market was still much higher than the figure for the Euro corporate bond market.

One source of growth in corporate bond markets has come from reactions to the low-interest-rate environment by investors such as financial institutions looking for higher returns. These investors are moving away from cash, government bonds, and other lower return liquid investments in favour of investment grade corporate bonds. This has boosted corporate bond issuance. Another source of corporate issuance is the wave of merger and acquisition activities. Although the Euro corporate bond market has grown significantly, the average number of US corporate bonds issued on a monthly basis is still five times higher (see Chart 2).

For the US corporate bond market and the Euro corporate bond market respectively, the composition of the issuance has shifted from higher rated bonds to lower rated bonds, especially BBB rated bonds. This increase is mainly led by the higher returns that investors can earn on BBB rated bonds compared to AAA rated bonds (see Section 5). Chart 2 shows that this is not only a temporary shift over the last three years. From 1990 to 2003, the composition of the issuance of US corporate bonds has continuously shifted in favor of lower rated bonds. In 2003, the issuance of BBB rated bonds was five times as high as the issuance of higher rated bonds (AAA and AA rated bonds). Much of this shift is demand driven. Furthermore, mature markets seem to be better suited than less developed markets for issuing lower rated bonds because they are more transparent and liquid.

2.2 Measures of Credit Risk

Investors should be aware that shifting from government bonds to corporate bonds involves credit risk. Credit risk mainly covers two components: (i) default risk and (ii) recovery risk. Default risk reflects the fact that the counterparty in a financial contract (e.g. bond issuer) may not be able or willing to repay the contractual coupon and face value.[3] The recovery risk captures the uncertainty about the proportion of the loss that will be recovered if, e.g., bondholders default.

The credit spread gives an indication of the market's assessment of credit risk. The literature presents two well-known measures for credit risk: (1) **bond yield spreads**, and (2) **credit default swaps (CDS) spreads**.[4] Another measure, which will not be discussed in detail here, is a firm's credit rating. The latter measure primarily reflects the likelihood of default and does not necessarily provide the most adequate assessment of the debt's credit quality. Even if credit ratings predict a substantial part of credit spreads, they do not tell us what information is relevant for credit spreads. Furthermore, changes in the firm's credit quality, especially credit deteriorations, do not always result in immediate rating changes because of a "through-the-cycle" rating methodology (see, e.g., Holthausen and Leftwich (1986), Crouhy et al. (2001), Altman and Rijken (2003)).[5]

2.2.1 Bond Yield Spreads

The difference between the yield on a risky asset and an equivalent risk-free asset is often referred to as the bond yield spread. The risk-free rate is often proxied by the yield on a government bond or a swap contract. In the literature, it is standard to consider government bonds as default-free assets, given their relatively high liquidity and given that governments can in principle raise income by taxing their citizens, thereby avoiding default.

(3) In this paper we consider rating migration risk, which represents the risk of an upgrading or downgrading of the rating of a financial asset, as a part of default risk.

(4) In what follows, the term "credit spread" covers bond yield spreads as well as CDS spreads.

(5) The critique of rating agencies is mainly focused on the timeliness properties of agency ratings, not on the accuracy level itself.

The bond yield spread compensates the investor for the expected default losses on the risky bond. No investor would be willing to buy a risky corporate bond, if he could buy a risk-free bond at the same price, ceteris paribus. Corporate bonds will trade at a lower price ceteris paribus and, hence, at a higher yield, since there is the risk of losing (part of) the invested funds. The spread also consists of a risk premium to reward the risk-averse investor for the risk of possibly higher than expected losses. As an illustration, consider the following example. Suppose that we have a risk-free bond with a price of 100 and a risky bond with exactly the same characteristics, except that it has a default probability of 10 p.c. A risk-neutral investor will pay 100 for the risk-free bond and 90 for the risky bond. A risk-averse investor will pay 100 for the risk-free bond but only less than 90 for the risky bond. The stronger the risk-aversion of an investor, the lower the price he is willing to pay (or the higher the premium) for the risky bond.

Finally, it is very likely that the spread between default-risky and default-free yields also includes a premium for other factors such as liquidity risk, differences in tax treatments between government and corporate bonds, contingent contract specifications (e.g. call features) and systematics shocks.

2.2.2 Credit Default Swap (CDS) Spread

CDS is the most used credit derivative and can be viewed as default insurance on loans or bonds. The buyer of a CDS makes periodic payments to the seller of the CDS and in return obtains the right to sell to the CDS seller a bond issued by the reference entity (company or sovereign) for its face value if default or another credit event occurs. Using CDS data to mesure spreads has two major advantages (see Hull et al. (2002) and Cossin et al. (2002)). First, CDS spread data provided by a broker consist of firm bid and offer quotes from dealers. Once a quote has been made, the dealer is committed to trading a minimum principal (usually 10 million dollars) at the quoted price. However, bond yield data available to researchers usually consist of indications from dealers. So, there is no commitment from the dealer to trade at the specified price. Second, since CDS spreads are already credit spreads, there is no default-free benchmark needed to calculate the spreads. The main disadvantages of CDSs are their lack of liquidity and the absence of a (liquid) secondary market.

(6) The Merton model has been extended in several ways by relaxing some restrictive assumptions such as a deterministic risk-free term structure, zero-coupon debt as the only source of debt, and frictionless markets. However, the main conclusions are not altered by these extensions.

2.2.3 Relationship between CDS Spread and Bond Yield Spread

In theory, bond yield spreads should be closely related to CDS spreads. This is because of an arbitrage relationship that exists between credit default swap spreads and credit spreads for a given reference entity (see Duffie (1999), O'Kane and McAdie (2001), and Hull et al. (2002)). Suppose that an investor buys a T-year par bond with yield to maturity y issued by the reference entity. The investor can eliminate most of the default risk associated with the bond by buying a CDS at a spread (or rate) of y_{CDS}. By arbitrage, $y - y_{CDS}$ should approximately equal the risk-free rate, r_f. For $y - y_{CDS} < r_f$. shorting a risky bond, writing protection in the CDS market, and buying a risk-free bond would be profitable. Thus, this suggests that the credit spread should be equal to the CDS spread. The results of the empirical studies on the relationship between CDS spreads and bond yield depend on the choice of the default-free benchmark (see, e.g., Blanco et al. (2003), Longstaff et al. (2003) and Houweling and Vorst (2005)). Studies that use the swap rate as the default-free benchmark find bond yield spreads to be quite close to CDS spreads (Blanco et al. (2003)). Derivatives traders tend to work with the LIBOR zero curve (also called swap zero curve) as the benchmark because the LIBOR or swap rates closely correspond to the cost of capital of financial institutions. However, studies that use the Treasury rate as the default-free benchmark find significant differences.

3. Determinants of Credit Spreads

3.1 Theoretical Framework

Credit risk models generally boil down to one of two distinct approaches: *structural, contingent-claim or firm-value models* and *reduced-form models*. The **structural models,** initiated by Black and Scholes (1973) and Merton (1974), relate credit events to the firm's value and capital structure. Default occurs if the value of the firm falls below a barrier. In these models, credit events are endogenous. In contrast, the **reduced-form models** specify the credit event as an exogenous, unpredictable, statistical event, governed by some hazard-rate process. Although the latter category of models is used more often in pricing derivatives for reasons of mathematical tractability, structural credit risk models yield more insight into the determinants of credit spreads. Since the Merton model (see Box 1: Merton model) is one of the first structural credit risk models, the literature often refers to it as the representative of the structural models.[6]

Box 1 – Merton model

In the structural models, default occurs when the firm's asset value, V_T, falls below a specified critical value at maturity T. In the Merton model (1974), the critical value is given by the face value of the firm's zerobond debt, L, which is by assumption the only source of debt. In case of default, debt holders receive the amount V_T. The value of a default-risky zero-coupon bond at time T can be written as

Eq 1 $$D_T = \min(L, V_T) = L - \max(0, L - V_T)$$

The value of a default-risky zero-coupon bond equals the difference of the value of a default-free zero-coupon bond with face value L and the value of European put option written on the firm's asset value, with strike price L and exercise date T.(1) The payoff, $L - V_T$, is often called the put-to-default.

In the Merton model, the dynamics of the asset value of the firm can be described as

Eq 2 $$\frac{dV_t}{V_t} = rdt + \sigma_V dZ_t,$$

where *r* is the instantaneous expected rate of return, the variance of the return σ_V the underlying assets, and Zt a standard Wiener process.(2)

Since the sum of the firm's debt value and equity value equals V_T, the equity value at time T equals

Eq 3 $$E_T = V_T - \min(V_T, L) = \max(0, V_T - L) = C_T$$

The stockholders receive the difference between V_T and L in the case of no default and zero in the case of default. The firm's equity value can thus be seen as the value of a call option on the firm's assets. Issuing debt is similar to selling the firm's asset value to the bondholders while the stockholders keep a call option to buy back the assets. Using the put-call parity, this is equivalent to saying that the stockholders own the firm's asset value and buy a put option from the bondholders.

Merton (1974) derived a closed-form solution for the price/yield of a defaultable zero-coupon bond by combining equation (1) with the Black and Scholes formula for a European put option. The credit spread on a defaultable bond with maturity T, CR(t,T) is calculated as the difference between the yield on a defaultable zero-coupon bond with maturity T, $Y^d(t, T)$ and the yield on risk-free zero-coupon bond with maturity T, Y(t, T)

Eq 4 $$CR(t, T) = Y^d(t, T) - Y(t, T) = -\frac{\ln(l_t^{-1} N(-h_1) + N(h_2))}{T - t},$$

with $$h_{1,2} = \frac{-\ln l_t \pm 0.5\sigma_V^2 (T - t)}{\sigma_V (T - t)},$$

and $$l_t = \frac{LB(t,T)}{V_t} = \frac{L \exp^{-r(T-t)}}{V_t}.$$

(1) The bondholder has written a put option from the equity holders, agreeing to accept the assets in settlement of the payment if the value of the firm falls below the face value of the debt.

(2) A Wiener process Z has the following properties: (1) Z has uncorrelated and unpredictable increments, (2) Z has zero mean and variance t, and (3) the process Z is continuous.

N denotes the cumulative probability distribution function of a standard normal. $L_t = LB(t, T)$ is the present value of the promised claim (the face value) at the maturity of the bond and $B(t, T)$ presents the value of a unit default-free zero-coupon bond. l is the leverage ratio, r the continuously compounded risk-free rate and σ_V the volatility of the firm's asset value. For simplicity, we assume that the payout or dividend ratio equals zero.

Equation (4) shows that the credit spread is a function of the risk-free interest rate, the firm's asset value, and the volatility of the firm's asset value. These factors will be discussed in more detail in Section 3.2.

The Merton model, which is discussed in more detail in the Box, and the structural credit risk models in general, provide a framework which identifies some important determinants of credit spreads, which include the risk-free interest rate, the asset value, and asset volatility. These variables are discussed in more detail below. In addition, we also discuss the slope of the default-free term structure, as this variable is implied by the structural models because it is closely related to the risk-free interest rate. Finally, we discuss two additional variables that do not come from the existing structural credit risk models but which are often mentioned in the literature on credit spreads: liquidity risk and taxation.

3.2 Factors Implied by Structural Credit Risk Models

3.2.1 Default-free Interest Rate

According to the structural credit risk models, we expect a negative relation between the (instantaneous) nominal risk-free rate and the credit spread.[7] The drift of the risk-neutral process of the value of the assets (see equation (2)), which is the expected growth of the firm's value, equals the risk-free interest rate. An increase in the interest rate implies an increase in the expected growth rate of the firm value. This will in turn lower the probability of default and the credit spread. Structural credit risk models show that for firms with moderate and high (low) debt levels, the effect of an interest rate change decreases (increases) with the term to maturity. However, the interest rate effect always remains stronger for firms with higher debt levels. Since firms with a higher debt level often have a lower rating, we expect that the interest rate effect is stronger for lower rated firms.

Furthermore, lower interest rates are usually associated with a weakening economy and higher credit spreads. In the long run, however, low interest rates might stimulate investment and thus economic growth. This reasoning would lead, in contrast to what was said above, to a positive relation between the risk-free rate and credit spreads. Box 2 discusses which relation arises empirically.

3.2.2 Slope of Default-free Term Structure

The interpretation of the effect of the slope of the default-free term structure on credit spreads is similar to that of the effect of the default-free rate. The expectations hypothesis of the term structure implies that the spread between the long-term and the short-term rate, which is often called the slope, is an optimal predictor of future changes in short-term rates over the life of the long-term bond. As such, an increase in the slope implies an increase in the expected short-term interest rates. As in the case of the motivation for the risk-free interest rate above, an increase in the slope is expected to lower the price of the put option and reduce a firm's default risk. Furthermore, the slope of the term structure is often related to future business cycle conditions. A decrease in the slope is considered to be an indication of a weakening economy. Estrella and Hardouvelis (1991) and Estrella and Mishkin (1995, 1998) conclude that the yield curve is a good predictor of future economic activity and the probability of recession. A positively sloped yield curve is associated with improving economic activity, which might in turn increase a firm's growth rate and reduce its default probability. Therefore, we also expect a negative dependence between changes in the slope of the default-free term structure and credit spread changes.

3.2.3 Asset Price

Equation (4) includes the leverage ratio or the pseudo debt-to-assets ratio, namely l.[8] Firms with a low leverage ratio, where the asset value can easily cover the debt value, are unlikely to default. An increase in the leverage ratio increases the value of the put option and thus the credit spread. An increase in the firm's asset value, V, (for a given debt value) reduces the leverage ratio and the value of the put option. Therefore, we expect a negative relation between the firm's asset value and the credit spread. The effect of an asset price change is stronger for

(7) The risk-free rate that is referred to in the structural credit risk models is the nominal rate. In the remainder, we drop "nominal".

(8) Structural credit risk models often refer to the distance-to-default ratio, which is (1/l) (with l the leverage ratio).

bonds with a short to medium term to maturity and for firms with a high leverage ratio.

Structural models typically assume that the assets of the firm are tradable securities. In practice, however, the asset value has to be deduced from the balance sheet and is updated only on an infrequent basis. Therefore, the value of the assets is usually replaced by the equity value/returns for publicly traded companies. Studies that consider portfolios of bonds try to mimic the average stock return of the issuing firms by including the value (return) of a stock index that is related to the portfolio. For a portfolio of, e.g., Euro bonds issued by the financial sector, the average asset value is often proxied by the return of a Euro financial index.

3.2.4 Asset Volatility

Equation (4) shows that credit spreads are affected by the volatility of the firm's asset value. High asset volatility corresponds with a high probability that the firm's asset value will fall below the value of its debt. In that case, it is more likely that the put option will be exercised and thus, credit spreads will be higher. The effect of a volatility increase is larger for bonds with a high leverage ratio compared to bonds whose debt value is far below the asset value. Furthermore, the effect decreases with the time to maturity for bonds with a high leverage ratio. For bonds with a low leverage ratio, the effect first increases slightly and then remains constant.

Since the asset value, and thus asset volatility, is only updated on an infrequent basis, asset volatility is often replaced by equity volatility. As with asset volatility, an increase in equity volatility increases the probability that the put option will be exercised and therefore credit spreads will increase. Studies that analyse portfolios of bonds often use the volatility of a stock index that is related to the portfolio.

3.3 Other Factors

3.3.1 Liquidity Risk

Option models typically used in the structural approach assume perfect and complete markets where trading takes place continuously. These assumptions imply no differences in liquidity between bonds. However, in practice markets are not perfectly liquid, and liquidity may be an important determinant of credit spreads. Indeed, Collin-Dufresne et al. (2001), Elton et al. (2001), Houweling et al. (2004), and Perraudin and Taylor (2004) find evidence that liquidity significantly influences credit spreads. Investors require a premium for investing in less liquid assets. If liquidity risk were similar for government and corporate bonds, the liquidity premium should be cancelled out when taking the difference between the two yields. However, since government bond markets are larger and more liquid than corporate bond markets, an investor may expect an additional premium for lower liquidity in corporate bond markets. Hence, we expect a positive relationship between liquidity risk and credit spreads. Measures that are often used as proxies for liquidity risk are the bid-ask spread, trading volume, age, and bond issue size.

3.3.2 Taxation Differences

If taxation differences exist between corporate and government bonds or corporate bonds and swap contracts, bond yield spreads are likely to reflect these differences. It is well known that US municipal bonds have had a negative credit spread for the last 50 years, despite their lower liquidity and higher default risk in comparison with government bonds. The reason is that municipal bond interest payments are exempt from US federal income taxes. Even though part of the level of credit spreads might reflect the tax effect, it is very unlikely that the tax effect has a significant impact on changes in credit spreads given the rigid nature of taxation rates.

4. Detailed Empirical Analysis of Euro Credit Spreads

4.1 Introduction

This study, which is based on a Van Landschoot (2004), analyses the determinants of credit spread changes for different types of Euro corporate bonds between 1998 and 2002. More specifically, we investigate the relationship between credit spread changes and financial and economic factors for bonds with different maturities and investment grade rating categories. The main question is whether credit spread changes on bonds with different characteristics (rating and/or maturity) are differently affected by the various determinants of credit spreads. To our knowledge, this is the first paper on credit spreads that tests these differences for a wide range of maturities and rating categories with a data set of individual Euro corporate bonds.

4.2 Data Description

The analysis uses individual weekly bond data of the EMU Broad Market indices from January 1998 until December 2002 constructed by Merrill Lynch. The data set consists of 1577 corporate bonds issued by 448 firms and 250 AAA rated government bonds. The former are used to estimate the term structure of risky assets, whereas the latter are used to estimate the risk-free term structure. The EMU Broad Market indices are based on secondary market prices of bonds issued in the EMU bond market or in EMU-zone domestic markets and denominated in Euro or one of the currencies that joined the EMU. Besides bond prices, the data set contains data on the coupon rate, the time to maturity, the rating, the industry classification, and the amount issued. Ratings are composite Moody's and Standard & Poors ratings. The Merrill Lynch Broad Market index covers investment-grade firms. Hence the analysis is restricted to corporate bonds rated BBB and higher. Further, all bonds have a fixed rate coupon and pay annual coupons. To be included in the Merrill Lynch index, bonds should have a minimum size of 100 million euro for corporate bonds and 1 billion euro for government bonds. Because the EMU Broad Market index has relatively low minimum size requirements, it provides a broad coverage of the underlying markets.

4.3 Term Structure of Credit Spreads

In accordance with the structural credit risk models, we expect that the relation between credit spreads and macro-economic and financial variables depends on the leverage ratio (creditworthiness) of the issuer and the maturity of the bonds. In accordance with the existing empirical literature on credit spreads, we use credit ratings as a proxy for the leverage of the issuing firm. In order to obtain and easily compare credit spreads for a broad range of maturities and ratings, we estimate the term structure of credit spreads for four groups of bonds, namely AAA, AA, A, and BBB rated bonds. The term structure of credit spreads is calculated as the difference between the term structure of spot rates on corporate and government bonds.[9] The term structure gives the evolution of credit spreads as a function of the remaining time to maturity of the bonds. Since spot rates are not observable, we use an extension of the parametric model introduced by Nelson and Siegel (1987). This Nelson-Siegel (NS) model offers a conceptually simple and parsimonious description of the term structure of interest rates. It avoids over-parameterisation while it allows for monotonically increasing or decreasing yield curves and hump shaped yield curves. Diebold and Li (2002) conclude that the NS method produces one-year-ahead forecasts that are strikingly more accurate than standard benchmarks such as linear interpolation.

We add four additional factors to the original NS model in order to capture differences in liquidity, taxation, and subrating categories. First, if liquidity decreases, bid-ask spreads tend to widen and hence spot rates might go up. Second, to capture part of the taxation effect, we include the difference between the coupon of a bond and the

(9) There are a number of reasons for using the spot rates instead of yields to maturity. The yield to maturity depends on the coupon rate. The yield to maturity of bonds with the same maturity but different coupons may vary considerably. As such, the credit spread will depend on the coupon rate. Furthermore, if we use yields to maturity to calculate the credit spread, we compare bonds with different duration and convexity.

TABLE 1 AVERAGE CREDIT SPREADS ON BONDS WITH DIFFERENT RATINGS AND MATURITIES

Rating	Years to maturity			
	3y	5y	7y	10y
AAA	17.0 (3.4)	18.3 (6.7)	22.0 (9.0)	26.0 (11.0)
AA+	22.6 (4.3)	27.2 (7.7)	32.8 (10.2)	38.6 (11.6)
AA	27.0 (4.8)	31.6 (8.6)	37.2 (11.3)	43.0 (12.9)
AA–	37.1 (8.5)	41.7 (12.4)	47.3 (14.9)	53.1 (16.6)
A+	41.6 (9.9)	50.9 (15.1)	59.0 (18.1)	67.5 (20.4)
A	57.4 (17.6)	66.8 (22.8)	74.9 (25.4)	83.4 (27.4)
A–	80.6 (32.0)	89.9 (36.7)	98.0 (38.8)	106.5 (40.5)
BBB+	104.1 (27.0)	117.8 (31.2)	135.7 (30.4)	162.9 (31.1)
BBB / BBB–	154.2 (38.6)	167.9 (43.1)	185.8 (42.2)	213.0 (41.9)

Note : The table presents average and standard deviation (between brackets) of credit spreads on AAA, AA, A, and BBB rated bonds with different maturities. We use a data set of weekly data from January 1998 until December 2002.

average coupon rate of the sample. The underlying idea is that holders of high-coupon bonds need to pay more taxes compared to holders of low-coupon bonds. Finally, another reason why bonds might have different yields within a rating category is that they are not viewed as equally risky. Moody's and Standard and Poor's (S&P) both introduced subcategories within a rating category. While S&P add a plus (+) or a minus (–) sign, Moody's adds a number (1, 2 or 3) to show the standing within the major rating categories. Bonds that are rated with a plus (1) or a minus (3) might be considered as having a different probability of default compared to the flat letter rating (2). Therefore, we include a dummy for the plus subcategory and a dummy for the minus subcategory. (10)

Table 1 presents the summary statistics (average and standard deviation) of credit spreads on bonds with different ratings and maturities. The results show the well-known fact that credit spreads increase as the creditworthiness of the issuer decreases. Furthermore, credit spread volatility (standard deviation) is higher for bonds with lower ratings. Finally, credit spreads are higher for bonds with longer maturities.

4.4 Model Specification

We investigate the main factors driving credit spread changes on bonds with different characteristics, in particular ratings and maturities. The structural models provide guidance on identification of the main factors, namely the level and the slope of the default-free term structure, the stock return, and the volatility of stock prices. Furthermore, we also consider liquidity risk, measured as the bid-ask spread, and mean-reverting properties of credit spreads.

In order to analyse the main determinants of credit spread changes of bonds in rating category *j* and with years to maturity *m*, we estimate the following equation

Eq 5

$$\Delta CR_t = \alpha_0 + \alpha_1 \Delta i_{3,t} + \alpha_2 \Delta slope_t + \alpha_3 R^m{}_{t-1} + \alpha_4 \Delta volp_t + \alpha_5 \Delta voln_t + \alpha_6 liq_{t-1} + \alpha_7 \Delta liq_t + \alpha_6 (CR_{t-1} - \overline{CR}) + \nu_t$$

where *CR* is the estimated credit spread for a rating group (AAA, AA, A, and BBB). (11) The variables i_3 and *slope* are the level and the slope of the default-free term structure, respectively. The former is defined as the 3-month euro rate and the latter as the spread between the 10-year constant maturity euro government bond yield minus the 3-month euro rate. R^m and vol are the market return and volatility of the DJ Euro Stoxx. These variables should proxy the asset value of the issuing firm and its volatility (see Section 3.1.1). In a manner similar to Bekaert and Wu (2000) and Collin-Dufresne et al. (2001), we test whether the impact of volatility is asymmetric. Therefore, we make a distinction between positive *(volp)* and negative changes in the volatility *(voln)*. The variable *liq* is a proxy for liquidity risk, namely the average bid-ask spread of the bonds in our sample. We include the lagged level and the change in the bid-ask spread. Given the fact that bid-ask spreads are very small, the level might be more important than a change.

TABLE 2 EXPLANATORY VARIABLES AND EXPECTED SIGNS ON THE COEFFICIENTS IN THE EMPIRICAL ANALYSIS

Variable	Description	Expected sign
$\Delta i_{3,t}$	Change in 3 month euro rate	–
$\Delta slope_t$	Change in slope, i.e. 10 year minus 3 month euro rate	–
R^m_{t-1}	Weekly return on DJ Euro Stoxx, lagged one week	–
$\Delta volp_t$	Positive change in volatility of DJ Euro Stoxx	+
$\Delta voln_t$	Negative change in volatility of DJ Euro Stoxx	+
liq_{t-1}	Bid-ask spread, lagged one period	+
Δliq_t	Change in bid-ask spread	+
$CR_{t-1} - \overline{CR} = MR$	Credit spread minus average credit spread (mean reversion term)	–

Finally, $CR_{t-1} - \overline{CR} = MR$ is the deviation of the credit spread from its mean. This factor should capture the mean-reversion of credit spreads. If credit spreads fluctuate around a long-term average (equilibrium), the sensitivity to the lagged credit spread should be negative. Table 2 gives an overview of the explanatory variables and the expected signs on the coefficients.

Weekly data on the explanatory variables are obtained from Datastream and Bloomberg. We estimate the credit spread model using seemingly unrelated regression (SUR) methodology. This methodology has the advantage that it accounts for heteroskedasticity, and contemporaneous correlation in the errors across equations. Furthermore, we are able to test for significant differences in sensitivity coefficients for bonds with different maturities.

(10) For simplicity, we assume that the additional factors only affect the level of the term structure and not the slope.

(11) *CR* is the credit spread that results from the term structure estimation. It can be considered as an weighted average of the credit spreads in that rating category.

4.5 Empirical Results

Panels A, B, C, and D of Table 3 present the estimation results for bonds with different rating categories (AAA, AA, A, and BBB) and different maturities (3, 5, 7, and 10 years to maturity). The sensitivities of credit spreads on bonds with similar rating, e.g. AA, but different subrating, e.g. AA+, AA, and AA–, are very similar. Therefore, we focus on different ratings and not subratings. We perform Wald tests to analyse whether bonds with different maturities and/or ratings react in significantly different ways to changes in financial and macro-economic variables.[12]

The results show that changes in the level and the slope of the default-free term structure are two important determinants of credit spread changes. Consistent with the findings of Longstaff and Schwartz (1995), Duffee (1998), and Collin-Dufresne (2001) for the US and for Boss and Scheicher (2002) and Leake (2003) for Europe, we find a negative relation between changes in the level and the slope of the default-free term structure and credit spread changes. For AAA and AA bonds, the null hypothesis that the sensitivities in credit spread changes are similar for different maturities is rejected for both the level and the slope. The effects first increase with the time to maturity and then decrease. However, for A and BBB rated bonds the effects do not significantly depend on the maturity. Furthermore, the level effect is stronger for bonds with a lower rating or high leverage ratios. This is in accordance with the implications of structural credit risk models (see Section 3.1.1). However, the slope effect is very similar for AAA, AA, and A rated bonds. For BBB rated bonds, the slope effect is substantially larger. If we compare the level effect on credit spreads of, e.g., AAA and BBB rated bonds with 7 years to maturity, we find that a 100 basis point increase in the 3-month risk-free rate causes a 5.6 basis point decrease in the AAA credit spread and a 32.4 basis point decrease in the BBB credit spread.

The return and the implied volatility of DJ Euro Stoxx significantly influence credit spread changes. According to the structural credit risk models, the effects of the return and volatility should be larger for bonds with a higher leverage. The results indeed indicate that the sensitivity coefficients are higher for BBB rated bonds compared to AAA rated bonds. A 100 basis point increase of the weekly market return reduces the credit spread on AAA and BBB rated bonds with 7 years to maturity by 0.08 and 0.7 basis points respectively. The return effect is relatively weak compared to the effect of the level and the slope of the default-free term structure. For AA, A, and BBB rated bonds, we find that positive changes in the volatility significantly influence credit spread changes whereas negative changes do not. This is in accordance with the hypothesis that the effect of the volatility is asymmetric. For AAA, the results are less clear. Furthermore, Wald tests show that the effect of the return and the volatility do not depend on the maturity of the bonds. This can not be explained by the theoretical models that predict a stronger effect for bonds with a shorter maturity.

For AAA, AA, and A rated bonds, we find that the bid-ask spread significantly influences credit spread changes. However, changes in the bid-ask spread do not have a significant influence. This shows that the credit spread changes are more affected by the bid-ask spread itself than a change in the bid-ask spread. For BBB rated bonds, the level as well as the changes in the bid-ask spread significantly affect credit spread changes. In general, the effect of the bid-ask spread becomes stronger for bonds with a lower rating. An increase of 100 basis points in the bid-ask spread increases the credit spread on AAA (BBB) rated corporate bonds with 7 years to maturity by 23 (164) basis points. For AAA and AA rated bonds, the effect of the bid-ask spread becomes stronger for bonds with longer maturities. For higher rating categories, liquidity changes do not significantly affect credit spread changes. This might be due to the fact that these bonds are more liquid than BBB rated bonds and are not immediately affected by a change.

Finally, our results indicate that credit spreads are mean reverting. This means that if credit spreads are high, the changes are smaller or even negative such that the credit spread converges to its long-run average.

The factors suggested by the structural credit risk models explain between 10 p.c. and 39 p.c. of the evolution of credit spread changes, depending on the rating category and the maturity of the bond. The economic and financial variables included in our model (see Equation 5) have the highest explanatory power for BBB rated bonds. Furthermore, our model explains most of the variation of credit spreads on bonds with medium maturities. The adjusted R^2 is on average 19 p.c. for bonds with 3 and 10 years to maturity and 24 p.c. for bonds with 5 and 7 years to maturity. Our results indicate that bonds with different ratings and maturities behave differently.

(12) The results of the Wald test and a more detailed discussion of the results can be found in Van Landschoot (2004).

TABLE 3 DETERMINANTS OF CREDIT SPREAD CHANGES : ESTIMATION RESULTS

	Δi_3	$\Delta slope$	R_m	$\Delta volp$	$\Delta voln$	liq	Δliq	MR	R^2
Panel A : AAA rated bonds									
3 yr	–6.29	–6.80	–0.04	0.05	0.00	0.16	0.21	–0.11	24.4
	(0.00)	(0.00)	(0.13)	(0.25)	(0.91)	(0.01)	(0.57)	(0.00)	
5 yr	–8.31	–9.04	–0.06	0.08	–0.02	0.25	0.39	–0.10	33.7
	(0.00)	(0.00)	(0.01)	(0.05)	(0.66)	(0.00)	(0.24)	(0.00)	
7 yr	–5.98	–8.15	–0.08	0.08	0.04	0.23	0.31	–0.09	24.3
	(0.00)	(0.00)	(0.00)	(0.06)	(0.41)	(0.00)	(0.38)	(0.00)	
10 yr	0.53	–4.99	–0.10	0.06	0.14	0.18	–0.05	–0.08	11.4
	(0.79)	(0.00)	(0.00)	(0.29)	(0.01)	(0.03)	(0.91)	(0.00)	
Panel B : AA rated bonds									
3 yr	–5.86	–6.11	–0.04	0.13	0.02	0.45	0.99	–0.11	21.7
	(0.00)	(0.00)	(0.24)	(0.02)	(0.74)	(0.00)	(0.04)	(0.00)	
5 yr	–5.04	–6.65	–0.09	0.15	0.03	0.48	0.77	–0.10	25.1
	(0.00)	(0.00)	(0.00)	(0.00)	(0.53)	(0.00)	(0.07)	(0.00)	
7 yr	–2.79	–5.68	–0.13	0.16	0.04	0.43	0.52	–0.10	20.3
	(0.11)	(0.00)	(0.00)	(0.00)	(0.36)	(0.00)	(0.21)	(0.00)	
10 yr	1.25	–3.15	–0.18	0.13	0.04	0.41	0.49	–0.10	10.2
	(0.56)	(0.03)	(0.00)	(0.03)	(0.52)	(0.00)	(0.35)	(0.00)	
Panel C : A rated bonds									
3 yr	–10.60	–5.34	–0.14	0.31	0.07	0.91	1.04	–0.10	13.6
	(0.00)	(0.03)	(0.03)	(0.00)	(0.47)	(0.00)	(0.27)	(0.00)	
5 yr	–12.62	–9.61	–0.13	0.29	0.10	0.95	1.64	–0.09	15.2
	(0.00)	(0.00)	(0.06)	(0.01)	(0.37)	(0.00)	(0.11)	(0.00)	
7 yr	–10.67	–9.50	–0.19	0.29	0.07	0.80	1.64	–0.08	15.1
	(0.00)	(0.00)	(0.00)	(0.00)	(0.48)	(0.00)	(0.09)	(0.00)	
10 yr	–4.89	–5.18	–0.33	0.41	0.02	0.60	1.06	–0.07	17.4
	(0.17)	(0.03)	(0.00)	(0.00)	(0.85)	(0.00)	(0.25)	(0.00)	
Panel D : BBB rated bonds									
3 yr	–14.54	–14.24	–0.67	0.59	–0.22	1.85	4.33	–0.18	17.4
	(0.21)	(0.08)	(0.00)	(0.02)	(0.40)	(0.00)	(0.00)	(0.00)	
5 yr	–23.05	–21.39	–0.67	0.82	–0.38	1.97	5.56	–0.18	20.1
	(0.05)	(0.01)	(0.00)	(0.00)	(0.14)	(0.00)	(0.00)	(0.00)	
7 yr	–33.07	–32.27	–0.74	1.08	0.00	1.64	8.43	–0.17	32.5
	(0.02)	(0.00)	(0.00)	(0.00)	(0.99)	(0.00)	(0.00)	(0.00)	
10 yr	–52.42	–44.30	–0.88	1.62	0.71	0.89	11.57	–0.16	38.9
	(0.02)	(0.00)	(0.02)	(0.00)	(0.15)	(0.12)	(0.00)	(0.00)	

Note : Panel A, B, C, and D present the estimation results for credit spreads on respectively AAA, AA, A, and BBB rated bonds. The data set consists of weekly data from January 1998 until December 2002. The explanatory variables are briefly explained in Table 2. The model is estimated using Seemingly Unrelated Regressions (SUR). p-values are given between brackets. Coefficients that are significant at 5 p.c. level are in bold. The adjusted R^2 in the final column are given in p.c.

5. Comparison of European Versus Us Credit Spreads

As the US has a large and mature corporate bond market, most empirical studies on corporate credit spreads have concentrated on US data (Duffee (1998), Collin-Dufresne et al. (2001), Cossin et al. (2002), Elton et al (2001), and others). Empirical studies on the determinants of European credit spreads are rather limited (Boss and Scheicher (2002), Leake (2003), and Van Landschoot (2004)). An issue of interest is whether credit spreads on US corporate bonds are affected by the same factors and in a similar way as those on European corporate bonds. Chart 1 shows that the size of the Euro corporate bond market has become large enough (over the last decade) to make a comparison.[13] Furthermore, we consider whether bond characteristics such as maturity and leverage influence the relation between credit spreads and macro-economic and

(13) Before the EMU, the Euro corporate bond market was very small and illiquid. Therefore, it is very difficult (if not impossible) to investigate the effect of the formation of the EMU on the relation between credit spreads and macro-economic and financial variables.

financial variables in a similar way for the US and Europe. The leverage is often proxied by the rating.

In this section, we review studies that proxy the credit spread by the bond yield spread and not the CDS spread.[14] The reason is that the CDS market is much less developed than the corporate bond market. Furthermore, we focus on studies that analyse the determinants of credit spread changes instead of levels. The reason is threefold. First, even though it seems implausible that any credit spread would actually explode, as a unit root process could, credit spreads are highly persistent. This may result in biased estimates (see Ferson et al. (2003) for a detailed analysis of spurious regression bias). Second, the holder of a default-risky asset is mainly interested in the changes in the credit spread. Third, focusing only on credit spread changes makes it easier to compare the magnitude of the sensitivity coefficients.

5.1 Empirical Evidence on the Determinants of Credit Spreads

For the US, we briefly discuss and compare the results of Longstaff and Schwartz (1996), Duffee (1998), and Collin-Dufresne (2001). For Europe, we briefly discuss and compare the results of Boss and Scheicher (2002), Leake (2002), and Van Landschoot (2004). Longstaff and Schwartz (1996), Duffee (1998), and Leake (2002) mainly focus on the relation between the risk-free term structure and credit spreads, whereas the others attempt to explain as much as possible of the variation of credit spreads. Table 4 gives an overview of the main variables that are included in the different studies and the sign of the sensitivity coefficients.

Longstaff and Schwartz (1995) investigate the relationship between interest rate changes and credit spread changes on investment grade US indices for different sectors (utilities, industrials, and railroads) and investment grade ratings between 1977 and 1992. The authors do not make a distinction between bonds with different maturities. The results show a significant negative relation between credit spread changes and 30-year Treasury yield changes for all sectors. The effect is stronger for industrials and railroads compared to utilities. Although the authors do not discuss this issue, the results seem to indicate that the effect is stronger for lower rated bonds. Furthermore, they find a significant negative relation between credit spread changes and the return on the corresponding S&P stock index. The latter effect monotonically declines with the credit rating for utilities and industrials. The regression results show that a 100 basis point increase in the 30-year

(14) Cossin et al. (2002) is one of the few studies analysing the determinants of CDS spreads.

TABLE 4 OVERVIEW OF THE DETERMINANTS OF CREDIT SPREAD CHANGES

	Δi	$(\Delta i)^2$	$\Delta slope$	Δvol_{int}	R^m	Δvol	liq	SMB	HML	MR	R^2
Panel A: US data											
Longstaff & Schwartz (1995)	(–)				(+)						41
Duffee (1998)	(–)		(–)								42
Morris et al. (1998)	(–)										30
Joutz et al. (2002)	(–)		(–)		(–)			(–)	(–)		29
Collin-Dufresne et al. (2001)	(–)	(–)	(–)		(–)	(+)	(+)	(–)	(–)	(–)	25
Panel B: European data											
Boss & Scheicher (2002)	(–)		(–)	(+)	(–)	(+)(1)	(+)				40
Leake (2003)	(–)		(–)								7
Van Landschoot (2003)	(–)		(–)		(–)	(+)	(+)			(–)	23

Note: This table presents an overview of the determinants (see below) of credit spread changes i = interest rate; slope = slope of the default-free term structure; vol_{int} = interest rate volatility; R^m = market return; vol = equity volatility; liq = proxy for liquidity; SMB = Small minus Big (Fama-French factor); HML = High minus Low (Fama-French factor); MR = mean reversion (lagged level). We mention the sign of the coefficient: positive (+), negative (–) or zero (0). If the coefficient is significant at the 5 p.c. level, it is presented in bold. All studies in Table 5, except Longstaff and Schwartz (1995), include R^m lagged one period instead of R^m. The adjusted R^2 in the final column is given in p.c.

(1) Only financials.

Treasury yield and a 100 basis points return reduces Baa rated utility credit spreads by 18 basis points and 1.6 basis points respectively. The paper does not test whether the sensitivity coefficients differ significantly between different types of bonds. Their two-factor model explains on average 41 p.c. of the variation in credit spreads, with a minimum of 1.1 p.c. for Baa utilities and a maximum of 74 p.c. for Baa railroads.

Duffee (1998) analyses the relationship between changes in corporate bond yield spreads and changes in the Treasury yields. This study uses a data set of monthly US callable and noncallable investment grade corporate bonds (1973-1995) and constructs indices for different rating categories and three maturity ranges. The results provide evidence that changes in the level and the slope of the term structure are negatively related to credit spread changes. The magnitude of the latter coefficient becomes larger for lower rated bonds and longer maturities. The regression results show that an increase of 100 basis points in the 3-month risk-free rate and the slope (10-year minus 3-month risk-free rate) reduce the AA long maturity credit spread by 29 basis points. However, the results do not show whether the maturity significantly affects the relation. The authors also conclude that there is no compelling evidence that yield spreads for different business sectors react differently to Treasury yields and that the inverse relationship between corporate bond yields and the Treasury bill yield is much stronger for callable bonds. Duffee's two-factor model is able to explain 42 p.c. of the variation in credit spreads.

Collin-Dufresne et al. (2001) analyse the determinants of credit spread changes using a panel data set of individual monthly US industrial bond data (1988-1997) for rating categories (AAA to B) and two maturity categories. The sensitivity coefficients to changes in the level and the slope of the default-free term structure, the S&P return, changes in the S&P volatility, and liquidity proxies all have the expected sign and are significant. Although they do not find significant differences between bonds with different ratings and maturities, their model performs worst when explaining variations in long-term, high-leveraged bonds. Including other financial and economic variables such as liquidity proxies, Fama-French factors (small-minus-big (SMB) and high-minus-low (HML)), and leverage provide only limited additional explanatory power.[15] Furthermore, they find that, contrary to the predictions of the structural models, aggregate factors are much more important than firm-specific factors.

Boss and Scheicher (2002) analyse the determinants of credit spread changes on Euro corporate bonds (financials and industrials) and on US corporate bonds (industrials). They find that the level and the slope of the default-free term structure are the most important determinants of credit spread changes. In addition, stock returns and implied volatility of stock returns have the expected sign and significantly affect credit spread changes for industrials. Liquidity proxies are not significant at a 5 p.c. level. The results for US credit spread changes are very similar to those for Euro credit spread changes, except that the former are also affected by liquidity changes. The model explains on average 35 p.c of the variation in credit spread changes.

Leake (2003) analyses the relation between credit spread changes on sterling corporate bonds and the term structure of UK interest rates. Using weekly data, they find a significant negative relation between changes in the level and the slope of the risk-free UK term structure and credit spread changes. Credit spreads fall by between 5 and 16 basis points for a 100 basis points rise in the level or the slope (over a period of one week). Their model explains on average 7 p.c. of the variation in credit spread changes.

(15) Fama and French (1993) find that HML and SMB, which are also called Fama-French factors, significantly affect stock returns. HML is the return on high minus low capitalization portfolios and SMB is the return on small minus big book-to-market portfolios. HML and SMB are assumed to capture the risk related to size and book-to-market ratio. See Fama and French (1993) for a detailed overview.

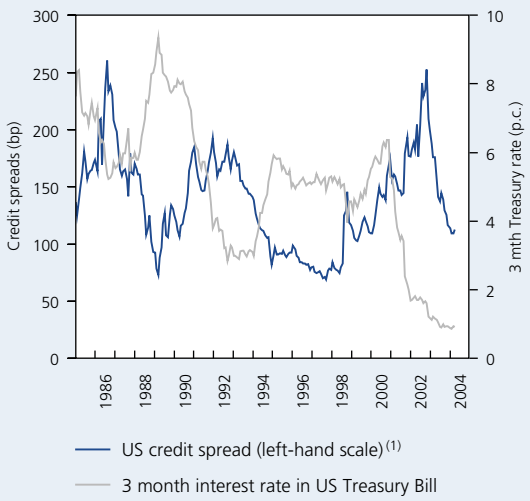
Box 2 – Relation between Credit Spreads and the Risk-Free Interest Rate over Time

Theoretical credit risk models, explicitly or implicitly, include a relation between credit spreads and the risk-free rate. The Merton type credit risk models posit a negative relation between credit spreads and the risk-free rate (see Black and Cox (1976), Leland (1994), Longstaff and Schwartz (1995), Zhou (1997), and others).[1] Recent empirical studies of Longstaff and Schwartz (1995), Duffee (1998), and Collin-Dufresne et al. (2001) also find evidence of a negative relation between credit spread changes and changes in the risk-free rate.

(1) See Sections 3.2.1 and 3.2.2 for a discussion on the relation between credit spreads and the risk-free rate according to the Merton type credit risk models.

Morris et al. (1998) and Joutz et al. (2002) argue that the finding of a negative relation between credit spreads and the risk-free rate is due to the fact that studies analysing credit spread changes automatically focus on the short-term relation. Both studies use a data set of US corporate bonds and apply a cointegration approach to model the long run and short-run relations between credit spreads and Treasury rates. They find that, initially, an increase in the Treasury rate causes credit spreads to narrow, which is in accordance with the structural credit risk models. However, this effect is reversed in the long run with higher rates causing increasing credit spreads. In the short run, a decrease of the risk-free interest rate is usually associated with a weakening economy and thus high credit spreads. However, a low-interest rate-environment is likely to stimulate investment and economic growth and to lower credit spreads after some time. Morris et al. (1998) only focus on the risk-free rate as an explanatory variable and find that their model explains on average 30 p.c. of the variation in credit spreads on Moody's investment grade bond indices (Jan. 1960 - Dec. 1997). Joutz et al. (2002) also find that credit spread changes are significantly negatively related to changes in the level and the slope of the default-free term structure. Furthermore, they find that the market return, small-minus-big (SMB), and high-minus-low (HML) are significantly negatively related to credit spread changes. Similar studies for the Euro corporate bond market have not been undertaken because the latter has a much shorter history compared to the US corporate bond market.

CHART 1 US CREDIT SPREADS AND SHORT TERM INTERREST RATE



Source : Bloomberg (Merrill Lynch) and Datastream.

(1) Calculated as the difference beween the US corporate and governement bond yield (all maturities).

Chart 1 presents the credit spread on US corporate bonds and US 3 months Treasury Rate. It shows that the US credit spread often lags the US Treasury rate, which is in accordance with the long-run relation discussed in Morris et al. (1998) and Joutz et al. (2002). Decreases in the Treasury rate at the end of 1980, the beginning of 1990, and the beginning of 2000 are followed by decreases in the credit spread (with a lag of one year). However, an increase in the Treasury rate in 1994 was not followed by an increase in the credit spreads. Chart 1 also shows that in the short run an increase in the Treasury rate often coincides with a decrease in the credit spread. For the Euro area, the history of the Euro corporate bond market is too short to draw (strong) conclusions, especially for the long run relation.

5.2 Comparison of European and US Credit Spreads

We now compare findings for the US and Europe based on the empirical results in Longstaff and Schwartz (1995), Duffee (1998), and Collin-Dufresne et al. (2001) for the US and Boss and Scheicher (2002), Leake (2003), and Van Landschoot (2004) for Europe. Notice that not all studies focus on the same variables. Therefore, "all studies" means those studies that focus on a particular variable or relation.

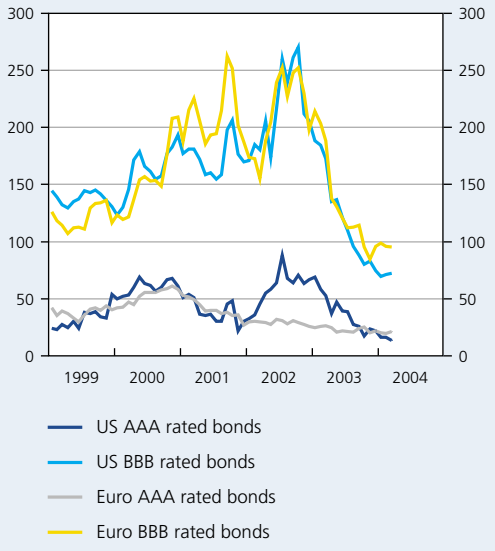
1. There is a significant negative relation between credit spread changes on European and US corporate bonds and changes in the European and US risk-free rate, respectively. In general, the effect becomes stronger for bonds with a lower rating (higher leverage).
2. For the slope effect, all studies find a significant negative relation between credit spread changes and changes in the slope of the default-free term structure. Most studies provide evidence that the slope effect slightly increases for lower ratings.
3. It is unclear whether the effect of changes in the risk-free rate and the slope of the default-free term structure depend on the maturity of the bonds. Duffee (1998) and Van Landschoot (2004) find that the effects are smaller for bonds with shorter maturities, whereas Collin-Dufresne et al. (2001) do not find different sensitivity coefficients for bonds with short and long term maturities.
4. In general, the sensitivity of credit spreads to changes in the level and the slope of the default-free term structure do not differ significantly between studies on US and European credit spreads, i.e. the sensitivity coefficients are not persistently different.
5. There is a significant negative relation between US and European credit spread changes and the US and European market return respectively. The sensitivity coefficients for the US and the European are similar. Finally, there is no clear evidence that the effect depends on the rating.
6. A change in the risk-free rate is economically much more important than the market return. The effect of a change in the risk-free rate on credit spread changes is much stronger than the effect of the market return. Furthermore, Collin-Dufresne et al. (2001) find that the market return, which is an aggregated return, has a much larger impact than the firm-specific equity return.
7. There is a significant positive relation between credit spread changes and changes in the volatility of the market. The impact of volatility is similar for US and Euro credit spread changes. Collin-Dufresne (2001) and Van Landschoot (2004) find that the effect of the volatility is asymmetric, i.e. positive changes in the volatility have a much larger impact than negative changes.
8. Liquidity proxies have a significant impact on credit spread changes in Collin-Dufresne et al. (2001) and Van Landschoot (2004). In both studies, the effect becomes stronger for lower rated bonds.

The empirical results in Section 3 and the overview of the literature suggest that the determinants of credit spread changes on US and European corporate bonds are very similar. Although the Euro corporate bond market is less liquid and smaller than the US corporate bond market (see Chart 1), the conclusions are very similar.

The magnitude of the effects depends more on the leverage or rating of the issuing firm and the maturity of the bond than on the country or currency of issuance. To illustrate these findings, we plot the credit spreads on AAA and BBB rated US and Euro corporate bonds with 7 to 10 years to maturity (see Chart 3). The credit spreads on bonds with a similar rating but issued in different regions (US and Euro area) behave in a much more similar way than the credit spreads on corporate bonds with different ratings (AAA and BBB) but issued in the same region. Credit spreads on BBB rated bonds are higher and more volatile than credit spreads on AAA rated bonds, regardless of the country or currency of issuance. We find similar results for bonds with different maturities. Credit spreads on US and Euro corporate bonds with 1-3 (or 7-10) years

CHART 3 CREDIT SPREADS ON US AND EMU AAA AND BBB RATED CORPORATE BONDS WITH 7 TO 10 YEARS TO MATURITY

(Basis points)



Source : Bloomberg (Merrill Lynch).

to maturity behave much more similarly than do credit spreads on Euro (US) corporate bonds with 1-3 and 7-10 years to maturity.

The creation of a Euro corporate bond market has improved (reduced) the diversification (concentration) of credit risk (by definition) because investors have the opportunity to invest in more regions. However, one should not exaggerate this effect. Credit spreads and thus market prices of US and Euro corporate bonds behave in very similar ways. Although we do not perform a detailed analysis of credit risk diversification, Chart 3 seems to indicate that investors should diversify their portfolio by investing in bonds with different ratings and/or maturities.

Empirical studies for both regions are unable to explain more than 45 p.c. of the variation of credit spread changes. This suggests that we still have limited knowledge about the determinants of credit spread changes. Interestingly, it does not appear as if the residual component of the credit spread changes, i.e. the component that remains unexplained by credit risk models, can be considered as idiosyncratic risk. Along these lines, Collin-Dufresne et al. (2001) perform a factor analysis and find that the residual component is mainly driven by one systematic component. We expect that a similar result would be obtained if such an exercise were to be undertaken for Europe.

6. Additional Factors to Explain Credit Spreads

6.1 Components of Credit Spreads

As suggested above, a question that is still unresolved in the literature is why a large part of the dynamics of credit spreads remains unexplained. In order to address this question, several studies (Elton et al. (2001), Delianedis and Geske (2002), Driessen (2003), D'Amato and Remolona (2003), and Perraudin and Taylor (2004)) attempt to decompose the credit spread into several factors such as expected loss, tax effect, liquidity risk, and a risk premium. The risk premium is often defined as an additional premium for risk-averse investors.[16]

Elton et al. (2001) decompose the credit spread into three components, namely expected loss, tax effect, and a risk premium. They find that the taxation difference between corporate and government bonds have a larger impact on credit spreads than expected loss. Furthermore, they conclude that the part of credit spreads that is not accounted for by taxes and expected default (85 p.c.), can be explained as a reward for bearing systematic risk. Driessen (2003) decompose the credit spread into four components, namely expected loss, tax effect, liquidity, and a risk premium. The author describes the risk premium as a premium for the risk associated with changes in credit spreads (if no default occurs) and the risk of the default event. The latter is associated with the jump in prices in case of a default event (default jump risk).[17] The empirical results seem to imply that the default jump risk is not fully diversifiable. Expected loss explains only between 3.5 to 34.7 percent of the credit spreads. Furthermore, the importance of taxes, the risk premium, and the liquidity premium depend on the rating and maturity of the bond. Perraudin and Taylor (2004) find that liquidity significantly influences credit spreads. Making a distinction between low and high liquid bonds according to various liquidity proxies results in spread differences of 10 to 28 basis points for AAA to A grade bonds.

D'Amato and Remolona (2003) argue that credit spreads are largely a compensation for the difficulty of diversifying credit risk *(diversification risk)*. They argue that the assumption that investors can diversify away unexpected losses (which are any losses different from the mean) of default risk by holding a large enough portfolio does not hold in practice. The nature of default risk is such that the distribution of returns on corporate bonds is highly negatively skewed, i.e. the distribution has a long left tail.

As an illustration of skewness, consider the following example. Suppose that we have a portfolio of assets with an average return of 5 p.c. and a standard deviation of 2 p.c. If the distribution of the portfolio returns is strongly negatively skewed, investors have a higher probability of earning returns that are far below the average return of 5 p.c. (extreme losses) than earning returns much above 5 p.c. Investors want to be compensated for this risk unless it can be diversified away. D'Amato and Remolona (2003) conclude that skewness in returns is a critical factor that stands in the way of diversification.

Another factor that may also explain the poor results of previous empirical analyses of credit spreads is recovery risk. The expected loss on a bond depends on the probability of default and the loss given default (or recovery rate). It is very likely that bonds with a high recovery rate will have lower credit spreads. However, individual data on recovery rates are not readily available. Therefore, most empirical studies assume a constant recovery rate, which is similar across assets.

(16) Note that there is no unique definition of "the risk premium". Different studies often have different definitions.

(17) Elton et al. (2001) only consider the risk associated with changes in credit spreads.

6.1 Distribution of Stock and Bond Portfolios

Empirical studies show that credit risk loss distributions have thick tails, i.e. are skewed. However, the prominence of these properties seems to depend on the composition of the specific portfolio under consideration (see Lucas et al. 2001). D'Amato and Remolona (2003) argue that the distributions of bond and stock portfolios are significantly different; bond returns are much more negatively skewed to the left. D'Amato and Remolona (2003) illustrate the difficulty of diversifying credit risk by presenting the loss distribution of two hypothetical bond portfolios.

Similar to D'Amato and Remolona (2003), we perform simulations to obtain the loss distributions of hypothetical portfolios. However, we simulate the loss distributions of bond and stock portfolios in a Merton framework. The aim is to analyse how the loss distribution depends on the composition of the portfolios, the size of the portfolios, the assumptions about the leverage of the firms, the correlation of the assets in the portfolios, and the risk-free rate.

6.1.1 Simulation Exercise: Assumptions

Suppose that we have three portfolios, one of 100 p.c. bonds (bond portfolio), one of 100 p.c. stocks (stock portfolio), one of 50 p.c. bonds and 50 p.c. stocks (mixed portfolio). To analyse whether the size of the portfolio influences the results, we consider portfolios with 50, 100, and 300 assets. We assume that each firm's asset value equals 100 at the start ($t = 0$). In order to evaluate the value of the portfolio after one period, say one year ($t = 1$), we need to make assumptions on how the asset value of the firms evolve. We assume that the average growth rate of the asset value equals 5 p.c., the asset volatility equals 3 p.c., and that the value can make jumps (see jump-diffusion process, i.e. a process that allows for sudden jumps in the asset value).[18] At time $t = 1$, we need to evaluate whether a firm has defaulted or not. In accordance with the Merton model, we assume that a firm has defaulted when the value of the assets falls below the value of the debt. We assume that a firm's balance sheet consists of 50 p.c. debt at time $t = 1$. This implies that a firm defaults if its asset value is smaller than 50 after one year. If default occurs, bondholders will recover the 'residual' asset value. So, the recovery rate is not fixed but depends on the asset value in the case of default. Stockholders lose everything in the case of default. We allow for a correlation of 0.1 between the asset value of the firms issuing bonds and/or stocks. The risk-free interest rate equals 4 p.c.

6.1.2 Simulation Exercise: Results

Table 5 shows the summary statistics of the simulated loss distribution of 9 portfolios: 3 stock portfolios (50, 100, and 300 stocks), 3 bond portfolios (50, 100, and 300 bonds), and 3 mixed portfolios (50, 100, and 300 assets). If we compare the loss distribution of the 100 p.c. bond portfolios and the 100 p.c. stock portfolios, we find that the average loss and the standard deviation of the stock portfolios are much larger compared to the bond portfolios. This is in accordance with our expectations,

(18) In the extreme case of no default, the loss distribution will be a flat line with a probability of one having zero loss. In order to have an "interesting" case study with some defaults, we allow for negative jumps in the asset value. There will be more defaults if we allow for larger negative jumps in the asset value.

TABLE 5 SUMMARY STATISTICS OF SIMULATED LOSS DISTRIBUTION

(Mean and standard deviation are given in percentages)

	Mean	Standard deviation	Skewness	Kurtosis
50 stocks	2.34	2.26	1.04	4.19
50 bonds	0.37	0.46	1.69	6.69
25 stocks & 25 bonds	1.35	1.32	1.07	4.29
100 stocks	2.33	1.72	0.95	4.26
100 bonds	0.37	0.35	1.37	5.64
50 stocks & 50 bonds	1.35	1.00	0.98	4.41
300 stocks	2.34	1.18	0.82	4.06
300 bonds	0.37	0.22	0.98	4.35
150 stocks & 150 bonds	1.36	0.69	0.83	4.08

Source: Own calculations based on 10,000 simulations.

namely that stocks are riskier. Mixed portfolios, i.e. portfolios of 50 p.c. bonds and 50 p.c. stocks, have an average loss and standard deviation between the stock and bond portfolios. If the number of assets increases, the volatility of the losses decreases for all portfolios.

The loss distribution of all portfolios is skewed, which means that the probability of having extremely high losses is higher than having almost no losses. The skewness of the loss distributions of the bond portfolios, is always larger than for the stock portfolios, although the difference in skewness between stock and bond portfolios becomes smaller for larger portfolios. The same holds for the kurtosis, i.e. the peakedness or flatness of the distribution.[19] Our results provide evidence that the loss distributions of bond portfolios are more skewed than stock portfolios and that the composition of portfolios matters. However, if investors hold a mixed portfolio, i.e. a portfolio of stocks and bonds, the skewness and the kurtosis are only slightly higher than for stock portfolios. This result brings into question the importance of the skewness of the loss distribution of bonds compared to stocks for financial institutions that have large mixed portfolios.

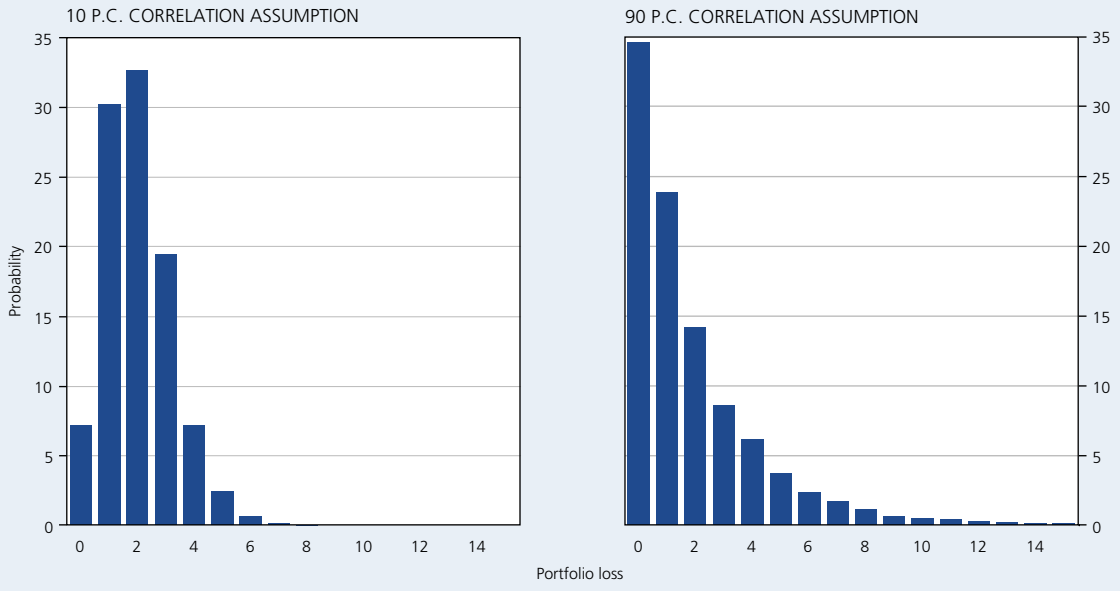
To analyse whether assumptions about the correlation between the firms' asset value, the interest rate, the leverage ratio, and the growth rate and the volatility of the firms' asset value influence the results, we change these parameters one by one. First, we change the correlation between the firms' asset value from 0.1 to 0.4 and 0.9. Changing the correlation from 10 p.c. to 40 p.c. does not alter the conclusions. However, if the correlation is extremely high (90 p.c.), the difference between the skewness of the loss distributions of stock and bond portfolios increases for larger portfolios, and diversification becomes more difficult. This result is not surprising, since a high correlation implies that the assets either all survive or default. Chart 4 presents the distribution of portfolios of 300 stocks assuming that the correlation between the firms' value is 10 p.c. and 90 p.c. respectively. Under the assumption of 90 p.c. correlation between the firms' asset values, the loss distribution is much more skewed, i.e. there is a higher probability of experiencing a large number of losses (see right part of chart 4). However, it is very unlikely that the correlation is that high in practice.

Notice that even under the assumption of a high correlation (e.g. 90 p.c.), the skewness of the loss distribution of mixed portfolios is still very similar to that of stock portfolios. This suggests that the 'problem' of the skewness of bond portfolios almost disappears when stocks are added (50 p.c.).

(19) The kurtosis of the normal distribution is 3. If the kurtosis is higher (less) than 3, the distribution is peaked or leptokurtic (flat or platykurtic).

CHART 4 SIMULATED LOSS DISTRIBUTION OF STOCK PORTFOLIO WITH 10 P.C. AND 90 P.C. CORRELATION ASSUMPTION

(Portfolio loss and probability are presented in p.c.)



Source : NBB.

In order to evaluate the effect of the leverage of the firm on our results, we change the composition of the asset value: 70 p.c. debt – 30 p.c. equity and 30 p.c. debt – 70 p.c. equity. Simulations with these new values, however, do not yield qualitatively different results. Furthermore, we find that changing the risk-free rate, the growth rate of the asset value, and the volatility of the asset value influences the results somewhat but does not alter the conclusions.

The main conclusions of the simulation exercise are:

- The skewness of the loss distribution of stock and bond portfolios is lower for larger portfolios (300 assets). This suggests that stockholders as well as bondholders can benefit from having larger portfolios.
- The skewness of the loss distribution of bond portfolios is higher than for stock portfolios. However, the difference significantly decreases for larger portfolios (300 assets) and with a low to moderate level of correlation between firm values (less than 40 p.c.).
- The skewness of the loss distribution of mixed portfolios is only slightly higher than for stock portfolios. Indeed, for large portfolios (300 assets), the skewness of the loss distributions is very similar. Thus, one may question the importance of skewness for institutional investors.
- Although we find that pure bond portfolios are more highly skewed than pure stock portfolios, this analysis does not indicate how important skewness is for credit spreads relative to other factors such as liquidity risk and the systematic shocks.

7. Conclusions

The main focus of this article has been the analysis of the determinants of corporate bond spreads in US and Europe. Structural credit risk models, introduced by Black and Scholes (1973) and Merton (1974), are used to derive determinants of credit spreads such as the risk-free interest rate, the asset value, and asset volatility. Our analysis of Euro corporate bonds (1998-2002), yields results in support of those reported in previous studies. We find a negative relation between changes in the level and the slope of the risk-free term structure and credit spread changes. In addition, we find that high return and a decrease in the volatility of the DJ Euro Stoxx reduces credit spread changes. We also find that credit spread changes significantly increase with liquidity risk. A general conclusion, however, that can be drawn from most empirical studies is that an important portion of the variation in credit spreads remains unexplained.

Our empirical analysis also indicates that the relation between credit spread changes and financial and macroeconomic variables depends on the rating and the maturity of the bonds. Credit spreads on bonds with lower ratings and longer maturities are often more strongly affected by macroeconomic changes than spreads on bonds with higher ratings and shorter maturities.

A comparison of results of empirical studies of US and European credit spreads reveals that the same factors are important for both regions. Even though the US corporate bond market is broader and more liquid, the results for European credit spreads are comparable with those for the US. Examination of the dynamics of credit spreads on different types of corporate bonds, however, suggests that this result should not be surprising. The effect of financial and macro-economic variables on credit spreads appears to depend more on the rating and maturity of the bonds than on the country or currency of issuance. Credit spreads on US and European rated bonds with the same rating exhibit a similar pattern, whereas credit spreads on European corporate bonds with different ratings behave differently.

Empirical studies to date have succeeded in explaining only a small portion of the variation in credit spreads. Several possible explanations for this lack of explanatory power have been put forward, such as liquidity risk, taxation differences, and a risk premium for systematic shocks. Most empirical studies find that liquidity risk and systematic shocks significantly affect credit spreads. Another explanation has been proposed by D'Amato and Remolona (2003), who suggest that diversification risk, i.e. the risk of unexpected losses from default that are present in bond portfolios and cannot be diversified, might explain a substantial portion of credit spread changes. Our simulation analysis has shown that the skewness of the loss distributions of pure bond portfolios is indeed higher than for pure stock portfolios. However, the skewness of mixed portfolios (50 p.c. bonds and 50 p.c. stocks) is very similar to that of pure stock portfolios. This result calls into question the importance of the skewness of pure bond portfolios for explaining credit spread changes. Although these simulations suggest answers to some questions regarding the loss distributions of bond and stock portfolios, it remains an open question as to how important diversification risk is relative to other factors in explaining credit spread changes.

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Interest Rate Risk in the Belgian Banking Sector

Konstantijn Maes

1. Introduction

Interest rate risk refers to the exposure of a bank's net interest income and the market value of its equity to unexpected changes in interest rates[1]. The exposure results from differences in the price sensitivities of assets and liabilities to unexpected interest rate changes, caused by maturity, duration, and repricing mismatches and the presence of embedded options in the balance sheet[2].

There are three factors motivating the supervisory authorities' current interest in measuring and assessing the interest rate risk in the banking sector. First and foremost, supervisors want to ascertain whether or not banks have sufficient capital in place to cover the interest rate risk incurred in their trading activity and asset and liability management. In this respect, it needs to be stressed that while the Basel I and II Accords represent milestones in supervisory policy by introducing minimum capital requirements for different categories of risk, they do not automatically impose an explicit capital charge tied to the interest rate risk in a bank's banking book. Instead, within the framework of Pillar II of Basel II, supervisors are asked to identify and monitor banks that run excessive banking book interest rate risk (so-called "outliers"). Supervisors can then impose a hedge on these banks or ask them to hold additional capital.

A second motivating factor follows from the continuing importance of interest rate risk in banks' balance sheets, despite the current low level and volatility of European interest rates and the trend towards disintermediation. Indeed, although fee income has become increasingly important, net interest income still accounts for more than half of total bank income. Moreover, given that Belgian banks finance a considerable proportion of their assets with sight and savings deposits, the effect of changes in market rates on the spread between deposit and market rates and on deposits withdrawals will potentially have a large impact on the ultimate interest rate risk exposure. Also, the risk of even small upward changes in long-term interest rates on the holding returns of bonds in the securities portfolio of banks must be acknowledged. Bond prices are potentially very sensitive to small policy changes that affect the short end of the yield curve. Campbell (1995) describes how initially modest Fed policy moves in 1994 triggered sharp increases in long bond yields that eventually culminated in a global bond market crisis.

Third, in the autumn of 2004 the European Commission is expected to endorse International Financial Reporting Standard 39 *Financial Instruments: Recognition and Measurement*. The standard aims at increasing transparency about a bank's risk-taking by imposing a stricter and more complete recording of its assets and liabilities. For example, the standard does not allow underperforming bonds to be shifted from the trading book (where they are marked-to-market) to the banking book (where they are booked at historical cost) to

(1) Within the scope of this paper, interest rate changes are assumed to originate from the risk-free non-callable zero coupon bond yield curve and not from changes in credit risk. The reader is referred to the paper "*The Determinants of Credit Spreads*" in this Financial Stability Review for evidence about the link between changes in risk-free interest rates and credit spreads.

(2) The embedded options materialize mainly in the form of sight and savings deposits withdrawals on the liability side and early loan repayments at the asset side of the balance sheet, conditional on a specific interest rate scenario. This paper will focus attention to the former. The reader is referred to Uyemura and van Deventer (1994) for US empirical evidence and references on the latter.

avoid a drop in bank net income. As such, the standard is expected to lead to increased volatility of Belgian bank income and capital. [3]

The paper is organised as follows. Section 2 focuses on the economic rationale behind the existence of intermediaries that expose themselves to interest rate risk by financing long-term assets with short-term liabilities and deposits. A bank that assumes a *maturity* mismatch does not necessarily assume a *repricing* mismatch. So, ultimately, we should explain why banks do not transform long (fixed) interest rates into short (variable) rates at small cost using interest rate swaps, since this would effectively eliminate the risk exposure that follows from the maturity mismatch. Section 3 quantifies and discusses popular measures of aggregate interest rate risk exposure in the Belgian banking system, reflecting a going concern as well as a market or liquidation view of the banking system. The two views are actually complementary in constructing a complete, true and fair view of interest rate risk exposure. We use repricing tables and gap reports to gain further insight into the total interest rate risk exposure of the Belgian banking system. Given that the treatment of deposits accounts turns out to be of paramount importance in a true and fair assessment of the interest rate risk exposure of Belgian banks, we also review the literature on deposit account modeling. Section 4 briefly describes the supervisory framework of the Basel II Accord for measuring, monitoring, and controlling the interest rate risk of banks. Section 5 concludes and summarises the main messages.

2. The economics behind interest rate risk exposures

2.1 Why maturity-mismatching banks exist

Individuals are typically risk averse and this characteristic is reflected in their preferences. Those with an excess of funds typically have a preference to lend short, while those with a shortage of funds have a preference to borrow long. Still, in the presence of perfect financial markets (Arrow and Debreu (1954)), there would be no need for maturity-mismatching intermediating banks, since savers and borrowers would execute their transactions directly in financial markets with sufficiently rewarded and willing counterparties (see also Modigliani and Miller (1958)). So, the true *raisons d'être* of banks are market imperfections such as information asymmetries, transaction costs, tax distortions and market incompleteness. [4]

Given the existence of market imperfections, there is a role for banks in bringing risk-averse savers and borrowers together. However, banks create a mismatch between the maturity of their assets and liabilities by issuing demandable and other short-term debt and granting long-term loans. Among many others Diamond (1984) and Gorton and Pennacchi (1990) try to understand the exact circumstances under which each of these two separate activities might require the existence of an intermediary, as opposed to being implemented directly through arm's-length financial markets. Although this literature yields many insights, only a few papers address the more fundamental question of why it would make economic sense for a single institution to carry out both functions under the same roof. Real synergies have to exist between the two activities, since if there exist none, there would be no *rationale* for the existence of loan making and deposit taking banks.

Kashyap et al. (2002) show that, indeed, so long as markets are imperfect, synergies exist between deposit-taking and loan-making activities. They argue that banks offer credit lines or loan commitments to their borrowers, such that the latter hold the option to draw down the loan on demand over a specified period of time. Once the decision to extend a credit has been made, the borrower can show up at any time and withdraw funds, just as with a demand deposit. In that sense, banks provide their customers with liquidity on both the liability and asset side to accommodate their unpredictable needs, extending the original Diamond and Dybvig (1983) argument [5]. Now, given that financial markets are imperfect, a bank cannot accommodate liquidity shocks instantaneously by raising new external finance, so that a buffer stock of liquid assets needs to be held. Holding this buffer is costly for several reasons: opportunity costs, tax distortions, increased agency costs, etc. So, if demand withdrawals and loan draw downs are not perfectly correlated, a real synergy arises and a bank would be able to hold a smaller total liquid asset stock than two separate institutions would have to hold jointly.

(3) The recent amendments to IAS 39 (IASB (2004)) seem to leave scope to reduce income volatility by applying the restricted fair value option. While hedge accounting imposes stringent documentation demands and is therefore unlikely to be used by Belgian banks, the restricted fair value option can be used as a short-cut alternative to hedge accounting to reduce income volatility. See the article "*Impact of IAS 39 on asset and liability management and banks' capital ratios*" in this Financial Stability Review. The interested reader is referred to ECB (2004) for a general discussion and impact study of more fair valuation of financial instruments.

(4) An important "market imperfection" in the Belgian legal environment is the favourable tax treatment of savings deposits ("gereglementeerde spaardeposito's/dépôts d'épargne réglementés"). The interest proceeds from savings deposits are currently tax-exempt insofar they do not exceed 3,040 euro per household, leading to their importance in the financing portfolio of a bank (see also Section 3.2).

(5) The classic motivation (Diamond and Dybvig, 1983) for banks to offer deposits derives from the existence of random liquidity shocks faced by depositors and the need for depositors to be insured against these liquidity shocks. The law of large numbers implies that aggregating over these idiosyncratic liquidity shocks leads to exploitable diversification benefits.

Other arguments have also been raised. Dermine (2003) lists several synergies between loan making and deposit taking that lead to real cost reductions. For example, there could be joint operating expenses in delivering deposits and loans, or the terms of mortgage loans could simply require the opening of deposit accounts. Diamond and Rajan (2001) argue instead that banks commit themselves to bearing withdrawal risk by issuing demandable deposits. Hence, the bank will be committed to do the utmost to collect from borrowers to repay depositors. If not, a run might be precipitated and the bank would fail. Similarly, Calomiris and Kahn (1991) argue that deposits may discipline bankers and hence, by submitting themselves to demandable deposits, bankers may attain a lower cost of capital. Finally, Mester et al. (2001) argue that deposits may help banks in monitoring borrowers, thereby becoming superior lenders.

2.2 Why repricing-mismatching banks exist

The previous section argues that risk aversion, market imperfections, and real synergies in banks' balance sheets may justify the existence of maturity-mismatching banks. However, banks can run maturity or duration mismatches yet still match the *repricing* characteristics of their assets and liabilities, and *vice versa*. For example, when a bank makes price-sensitive (fixed rate) long-term loans and finances them by less price-sensitive (variable rate) liabilities, it can always opt to swap the long-term fixed interest rates on the loans into short-term variable interest rates at small cost. So, we need to go one step further and understand why banks expose themselves to a repricing mismatch.

The existence of a positive average yield spread, being the difference between yields on long and short bonds, is *not* a sufficient reason for banks to lend at a long rate and borrow at a short rate, i.e. expose themselves to a repricing mismatch. Indeed, the short-term yield cannot simply be compared with the long-term yield to infer something about their relative returns (i.e. the *ex post* excess return). The short-term yield is an expected return over a short horizon or holding period, while the long-term yield is the expected return over a long horizon or holding period. If the two need to be compared, either the long-term yield has to be compared with the average yield of rolling over short-term bond yields over the life of the long bond, or the short yield has to be compared with the uncertain short-term holding return of the long bond. Both fair comparisons imply that *expectations about interest rate dynamics* and rewards for being exposed to interest rate risk – *expected excess returns or risk premia* – need to be taken into account. Given that both components are unobserved, we need a model to separate yields into expectations about interest rate dynamics and risk premia.[6]

2.2.1 Expectations about interest rate dynamics

The most simple no-arbitrage theory[7] is the *pure expectations theory*, where the assumption is made that bonds of different maturities are perfect substitutes. Hence short and long-term bonds are expected to earn the *same* return over the *same* holding period. Rolling over subsequent short-term bonds should earn the same return as buying and holding a long-term bond, which implies that the long-term yield is an average of current and future expected short-term yields over the life of the long-term bond. So if a positive yield spread is observed, this does not imply that long bond returns are expected to be higher than returns on short bonds (over any horizon). Instead, the theory predicts in that case that over the long horizon, short-term bond yields are expected to increase so that both short-term and long-term bonds are expected to earn the same amount over the horizon of the long bond. Alternatively, the theory predicts that over the short horizon the long rate tends to rise[8], such that the generated capital losses fully offset the initial yield advantage and expected returns are again identical.

If the pure expectations theory holds true, a yield spread will not lead to an increase in the market value of a bank's equity, irrespective of the size of the yield spread and the duration mismatch between assets and liabilities. This is explained by the fact that the short yield on the liability is expected to increase over the life of the long asset so that the present value of net interest income exactly equals zero. If interest rates increase by less than what is expected by market participants as reflected in current forward rates, then this is actually positive for the asset sensitive bank and the market value of its equity will increase. Duration is only (approximately) a correct measure for price sensitivity of equity when the implicit assumption that the yield curve is flat holds true.[9] Conversely, if the yield curve cannot reasonably be assumed to be flat, then the forward rate curve is the relevant benchmark for assessing the impact of an increase in the yield curve on the market value of equity (see Box 1 for a simple numerical illustration).

(6) Alternatively, we need models to separate forward rates into future yields and risk premia. Given the one-to-one relationship between zero coupon bond yields and forward rates, we choose not to discuss the latter in this paper.

(7) A thorough review of the class of affine no-arbitrage term structure models is outside the scope of this article (see Dai and Singleton (2000) and Maes (2004)).

(8) Notice the somewhat counterintuitive implication of the pure expectations theory, namely that if the yield spread is unusually large, long yields are expected to increase and not decrease over the short run (and *vice versa*). The paradox is solved once one acknowledges that short rates are also expected to increase, at a faster pace than long rates according to the theory. So, yield spreads will still tend to become smaller, when they are unusually large.

(9) Notice that in that theoretical case, the forward rate curve is identical to the yield curve and, hence, the market does not expect interest rates to increase or decrease in the future. As a result, any change in interest is by definition unexpected.

Box 1 – The forward rate curve as the benchmark for assuming a repricing mismatch

This Box aims to illustrate that a positive yield spread always involves risk. Assume that the zero coupon bond (ZCB) yield curve today looks as in Table 1.

TABLE 1 ASSUMED ZERO COUPON BOND YIELD CURVE AND IMPLIED 1-YEAR FORWARD RATES

(Percentages per annum)

Time to maturity / Time	ZCB yields	Implied 1-year forward rates (1)
1	2.00	2.00
2	3.00	4.01
3	4.00	6.03
4	5.00	8.06
5	6.00	10.10

(1) Implied 1-year forward rates can be derived from the ZCB yields. E.g., the forward rate that one can lock in today between 3 and 4 years in the future can be derived as 6.03 p.c. = $((1.04)^3 / (1.03)^2) - 1$.

Imagine that a bank considers financing a 5-year government coupon bond (face value 100, priced at par, ZCB yield curve as in Table 1, hence with yield and coupon rate equal to 5.768 p.c.) with a 1-year revolving time deposit (2 p.c.). The two yields 5.77 p.c. and 2 p.c. cannot be compared as such, given that the 5-year coupon bond yield is the average annual return over a holding period of 5 years, while the 1-year yield is the annual return over a holding period of 1 year. A comparison needs to be made on the same footing (i.e. holding period). Either we compare the 2 p.c. yield on the 1-year time deposit with the unknown 1-year holding return of the 5-year bond (given that its price might change), or we compare the 5.77 p.c. 5-year yield with the return of rolling over consecutive 1-year time deposits, where we need to acknowledge that the 1-year yields (returns) are uncertain between years 2 and 5.

However, uncertainty about future interest rates can always be eliminated by locking in future 1-year financing costs today, using the implied 1-year forward rates derived from the ZCB yields. If future 1-year interest rates are locked in or future interest rates are exactly equal to the implied forward rates, which is referred to as *scenario 1* in Table 2, then the initial 3.77 p.c. margin will turn negative in later years since locked-in financing costs can be seen to increase from 2.0 p.c. to 10.1 p.c.. The net present value of net interest income over the next five years is exactly equal to zero, so the market value of equity is *not* affected.

Interest rate changes that are in line with current forward rates do *not* affect the market value of a bank's equity, irrespective of any maturity mismatch. Only unexpected changes in interest rates will affect the market value of a bank's equity. If future financing costs are not locked in and if actual future interest rates are above what is implied by the forward rates, for example *scenario 2*, we find that market value of equity suffers from this unexpected increase in interest rates. However, if future interest rates increase but to a lesser extent than predicted by the forward rates, for example *scenario 3*, the market value of equity actually *increases*, despite the increasing short-term interest rates.

TABLE 2 SCENARIOS FOR FUTURE 1-YEAR INTEREST RATES AND THEIR IMPACT ON NET INTEREST INCOME

Year	Financing cost dynamics			Net interest income (NII) (1)		
	Scenario 1 Future short rates locked in or as expected	Scenario 2 Future short rates unexpectedly higher	Scenario 3 Future short rates unexpectedly lower	Scenario 1 Future short rates locked in or as expected	Scenario 2 Future short rates unexpectedly higher	Scenario 3 Future short rates unexpectedly lower
1	2.00 p.c.	2.00 p.c.	2.00 p.c.	3.77	3.77	3.77
2	4.01 p.c.	5.01 p.c. (+1 p.c.)	3.01 p.c. (–1 p.c.)	1.76	0.76	2.76
3	6.03 p.c.	7.03 p.c. (+1 p.c.)	5.03 p.c. (–1 p.c.)	–0.26	–1.26	0.74
4	8.06 p.c.	9.06 p.c. (+1 p.c.)	7.06 p.c. (–1 p.c.)	–2.29	–3.29	–1.29
5	10.10 p.c.	11.10 p.c. (+1 p.c.)	9.10 p.c. (–1 p.c.)	–4.33	–5.33	–3.33
Effect on market value of equity (NPV of sum of NII)				**nihil**	**–3.40**	**3.40**

(1) NII_t is computed as follows: (5.77 p.c.–1yr interest rate at t) * 100.
(2) The effect on market value of equity is computed as the sum of net present values of net interest income over the next 5 years (discounting by the zero coupon bond yields in Chart 1). For example, the effect on market value of equity for scenario 1 is computed as:
$3.77 / (1.02)^1 + 1.76 / (1.03)^2 + (–0.26) / (1.04)^3 + (–2.29) / (1.05)^4 + (–4.33) / (1.06)^5 = 0$.

2.2.2 Risk premia

It has been argued above that expectations that deviate from the market's interest rate expectations may motivate a bank to assume a repricing mismatch. However, in reality, no bank is able to *systematically* outguess market expectations. Hence, taking positions based on interest rate expectations will not lead to systematic increases (or decreases) in market value of equity and an alternative explanation is needed for the existence of repricing mismatching banks.

The existence of a *risk premium* or *expected excess return* turns out to be the main driver for assuming a repricing mismatch. The return that a long bond holder expects to receive over a short bond return (i.e. the risk premium) makes it potentially worthwhile to assume a mismatch. When risk premia are zero, a bank will be indifferent with regard to holding short or long assets and liabilities.

The *liquidity premium theory* builds on the pure expectations theory, but relaxes the assumption that bonds of different maturities are perfect substitutes. Indeed, risk-averse investors might very well prefer to hold short-term bonds because of their higher liquidity, driving up their price and driving down the yields at the short end. Put differently, investors may require a non-zero risk premium to hold the less liquid long-term bonds. In sum, while the pure expectations theory assumes risk premia to be zero, the liquidity premium theory relaxes this assumption and allows them to be maturity-dependent (but constant over time).

In the case of non-zero risk premia, yield spreads contain predictions of both (short- and long-term) yield changes and risk premia, and we need to disentangle yield spreads into both unobserved components. If either of the above two term structure theories holds in reality, that is if risk premia are zero or constant over time, then yield spreads are optimal predictors of future movements in yields. More specifically, both theories have implications for short-term changes in long yields and long-term changes in short yields. These predictions can be tested using simple regression analysis. In post-war US data (Fama (1984), Fama and Bliss (1987), Campbell and Shiller (1991), Campbell, et al. (1997)), short yields tend to increase when yield spreads are high – in line with the theoretical predictions –, but long yields tend to fall when yield spreads are high -counter to the theoretical predictions. So, to the extent that the yield spread forecasts short-term changes in the long rate, it does so in the *wrong* direction, amplifying the return differential between short and long bonds, instead of bridging it. Similar evidence for Belgian long-term interest rate dynamics is presented in Box 2.(10)

In sum, the regression evidence in the literature and in Box 2 suggests that neither the pure expectations nor the liquidity premium theory, although intuitively appealing, describes actual yield curve dynamics. With respect

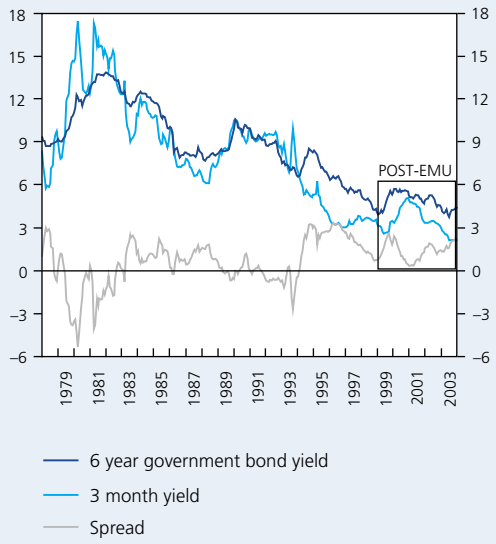
(10) No evidence is presented for the alternative test of long-term changes in Belgian short-term yields. Results for this alternative test are in line with the theoretical predictions (with respect to the sign of the coefficient) and are available on request.

Box 2 – Do the pure expectations and liquidity premium theories of the term structure hold in Belgium ?

Chart 1 plots the short and long end of the Belgian nominal yield curve between January 1978 and December 2003. The following observations can be made. First, the yield spread or yield curve slope is positive on average, but has fluctuated between –5.35 p.c. and +3.35 p.c. The last inversion of the yield curve dates from July 1993 and lasted until February 1994. Second, short-term interest rates are more volatile than long-term interest rates, which implies that non-parallel shifts of the yield curve are not exceptional. Third, the correlation between both interest rates is extremely high (94 p.c. in the full sample). Fourth, interest rates are heteroskedastic, i.e. their volatility is level-dependent. (1)

CHART 1 BELGIAN SHORT AND LONG TERM NOMINAL YIELDS

(Percentages ; monthly data)



Source : NBB.

At the very least, any candidate theory needs to explain two stylised facts about yield curves, namely that yields on short and long bonds move together, and that, on average, the yield curve is upward sloping. The pure expectations theory is able to explain the former but not the latter, while the liquidity premium is potentially able to explain both facts. So we focus attention on the test of the liquidity premium theory (i.e. including the maturity-dependent constant risk premium).

The liquidity premium hypothesis is the joint hypothesis that markets are rational and that risk premia are time-invariant. We can test the hypothesis by regressing changes in long yields on the (scaled) yield spread (formal derivation in Campbell et al. (1997)):

$$y_{n-1,t+1} - y_{nt} = \alpha_n + \beta_n \frac{(y_{nt} - y_{1t})}{n-1} + \varepsilon_{n,t+1}$$

(1) The conditional volatility is not observed without making a modeling assumption. We have used the RiskMetrics model to derive the conditional volatility of the 3 month interest rate. Results are available on request.

where y_{nt} is the yield at time t of a bond with remaining time to maturity n, and where $\varepsilon_{n,t+1}$ can be interpreted as a one-period-ahead prediction error. Hence, the error term should exhibit no autocorrelation, although it may be heteroskedastic. We use White (1980) standard errors to correct for the latter.

The liquidity premium theory can be rejected when the β_n slope coefficient differs from unity in a statistically significant way. In Table 1 below, we observe that the estimate for β_n is not only statistically significantly different from unity, but that it is even negative, implying that a larger than average spread tends to accompany a decrease in long interest rates, an apparent violation of the hypothesis. The results imply that a naive investor, who judges bonds by their yields to maturity and buys long bonds when their yields are relatively high (and not when their expected relative return is high, so disregarding the possible riskiness of the strategy), has tended to earn superior returns over the period 1978:01-2003:12 in Belgium.

TABLE 1 RESULTS FOR BELGIUM OF REGRESSING LONG YIELD CHANGES ON THE SCALED YIELD CURVE SLOPE (1978:01-2003:12)

	α_n	β_n
Coefficient estimate	–0.004	–1.215
Standard error (1)	0.019	0.784

Source: NBB.
(1) White (1980) standard errors are used. These standard errors correct for the possible impact of heteroskedasticity.

to these results, it is important to highlight the fact that these regression tests are always *joint* hypothesis tests, testing that market expectations are rational and that risk premia are constant. Given that the hypothesis is convincingly rejected, the result reflects *either* a failure of investor rationality *or* the presence of time-varying risk premia. Recently, Dai and Singleton (2002) and Maes (2003) have presented statistical evidence (11) that the existence of time-varying risk premia and not the irrationality of market expectations lies at the root of the expectations and liquidity premium theory rejections. Both studies conclude that market expectations are rational, but that the reward for being exposed to interest rate risk is complex and time-varying, and not zero, constant, or simply proportional to the level of the interest rate (as in Cox, et al. (1985)). Other candidate explanations have been proposed, stressing econometric problems, but Bekaert and Hodrick (2001) conclude that the latter cannot convincingly explain the widespread rejection of the expectations and liquidity premium theory. (12)

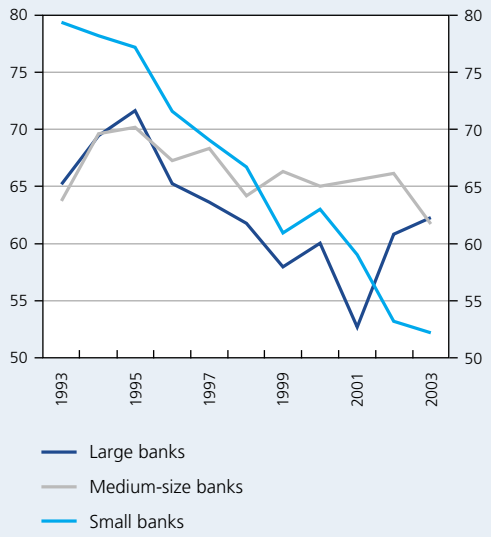
3. Measuring the interest rate risk exposure in the Belgian banking sector

A bank's net worth can be looked upon from two complementary perspectives: a going concern perspective and a market or liquidation perspective. Correspondingly, there are two main concepts used to assess interest rate risk: *net interest income at risk*, measuring how interest rate shocks affect net interest income, and *market value of equity at risk*, measuring how interest rate shocks affect the market value of equity. (13) In addition, interest rate changes may also trigger early loan repayments and deposit withdrawals, which cause a bank's cash flows to behave differently from expected. So, a cash flow risk also results from the embedded options in a bank's assets and liabilities.

(11) Their evidence is based on the panel estimation of the multi-factor affine class of term structure models.
(12) These explanations include small sample biases and the existence of Peso effects. Small sample biases may arise because of the persistence of yield spreads, whereas Peso problems arise if investors anticipate and price an event or regime change that does not materialise in-sample.
(13) Uyemura and van Deventer (1994) show that it is generally impossible to hedge both target accounts simultaneously against interest rate risk.

CHART 1 NET INTEREST INCOME AS PERCENTAGE OF TOTAL INCOME FOR LARGE, MEDIUM-SIZE AND SMALL BANKS (1)

(Data on an unconsolidated basis)



Source : NBB.

(1) Small banks are defined as having less than 500 million euro of total assets, large banks as having more than 10 billion euro of total assets.

3.1 Net interest income at risk

Chart 1 shows that *net interest income* is an important component of total income for Belgian banks.(14) The average ratio of net interest income to total income for 1993-2003 is somewhat above 60 p.c. for large banks and somewhat above 65 p.c. for medium-size and small banks.(15) These averages mask quite different dynamics and trends, however. While the ratio decreases almost monotonically for small banks from 80 p.c. to somewhat above 50 p.c., it is relatively stable for medium-size banks hovering between 60 p.c. and 70 p.c. The ratio for large banks starts and ends at the medium-size bank level but fluctuates more to the downside in the middle six years bottoming out slightly above 50 p.c. in 2001 but recovering again towards 2003. In general, the average ratio of net interest income to total income seems to have declined slowly over the last ten years reflecting a disintermediation trend.

(14) "Bank product" is used for total income, being the sum of net interest income and other income. Bank product is used to cover costs, value corrections with respect to the normal banking activity and taxes. The residual is the result of the income statement.

(15) Small banks are defined as having less than 500 million euro of total assets, large banks as having more than 10 billion euro of total assets.

The pronounced and continuous decline in small bank's net interest income as a percentage of total net income can be explained by the big banks' absorption of a large number of small banks, characterised by classic intermediating activities, where the remaining small banks are mainly the ones more specialised in non-interest income generating activities. The different dynamics of medium-size and large banks' net interest income ratios in the period 2000-2002 may have resulted from a stronger dependence on stock market performance of larger banks, for example through their commissions earned on UCITs specialised in equities.

To find out how net interest income of Belgian banks relates to yield spread and market interest rate changes, we regress quarterly net interest income on its lag, the yield spread, and changes in short and long-term interest rates. Results are presented in Table 1 for large, medium-size and small banks for the period 1993:Q1 to 2003:Q4. The following findings can be derived from the table. First, the large, positive, and significant coefficient on lagged net interest income for all banks suggests that the effects of changes in the slope of the yield curve and market interest rates, if any, are only felt gradually. Second, changes in short and long rates do not affect net interest income of banks in a statistically significant way. Third, net interest income of small and medium-size banks is affected in a statistically significant way by the yield spread over the period considered. The yield spread enters with a positive sign, suggesting that a steeper (flatter) than usual yield curve is associated with higher (lower) net interest income. If the yield spread were to increase by 100 basis points, ceteris paribus, quarterly net interest income of medium-size (small) banks would increase by 0.56 (0.06) million euro, i.e. 6.3 (9.0) p.c. of their average net interest income. For the large banks in our sample, we do not find statistically significant yield spread coefficients.

English (2002) reports results of a similar regression for a sample of countries based on annual data from 1979-2001. Overall, his conclusions are not clear-cut. He finds a significant positive spread effect for the US (in line with our results for medium-size and small banks), insignificant spread effects for 5 out of 10 countries and statistically significant negative spread effects for 4 out of 10 countries. He finds similar results to ours with respect to the weight of lagged net interest income and the insignificance of the changes in short and long rates (with a few exceptions). From these mixed results, he concludes that, in addition to changes in the slope of the yield curve, many other factors might also play a role in the dynamics of net interest income, including changes in technology and more subtle influences such as banks' hedging activities.

TABLE 1 RELATIONSHIP BETWEEN NET INTEREST INCOME, YIELD SPREADS AND MARKET INTEREST RATE CHANGES

(Data on an unconsolidated basis, 1993:Q1-2003:Q4)

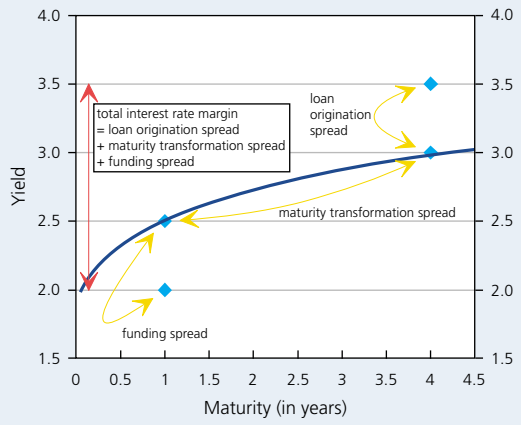
	Own lag	Yield spread	Change in short-term interest rate	Change in long-term interest rate
Large banks (1)				
Coefficient	0.92 (2)	5.80	3.150	–0.94
Standard error	0.10	5.60	12.70	27.90
Medium-size banks (1)				
Coefficient	0.83 (2)	0.56 (3)	0.33	–1.40
Standard error	0.09	0.32	0.59	1.30
Small banks (1)				
Coefficient	0.74 (2)	0.06 (2)	0.02	–0.03
Standard error	0.11	0.03	0.06	0.12

Source : NBB.
(1) Small banks are defined as having less than 500 million euro of total assets, large banks as having more than 10 billion euro of total assets.
(2) Denotes statistical significance at the 95 p.c. confidence level.
(3) Denotes statistical significance at the 90 p.c. confidence level.

In general, the concept "net interest income" covers more than the income generated by the maturity transformation role of banks. Typically, the bank's loan business unit is able to grant loans at a contractual rate that lies above the Euribor yield curve, and its deposit-gathering business unit is able to attract funds at a lower rate than it needs to pay in the interbank market. A matched maturity technique is often used to split the total interest rate margin (net interest income) into different components, attributable to loan origination, maturity transformation, and deposit financing. This decomposition is illustrated in Chart 2. From the Chart it is clear that the total spread that drives reported net interest income also remunerates the bank for the liquidity and credit risks that it assumes, apart from the mismatch risk. The loan origination and deposit financing spread will partially reflect the imperfect contestability of the market, regulatory barriers to entry, and the market power of the institution. If competition amongst banks is fierce, the latter spread components may even temporarily become negative.

CHART 2 TOTAL INTEREST RATE MARGIN (NET INTEREST INCOME) DECOMPOSITION

(Stylised illustration)



It is important that management understands what portion of their net interest margin is attributable to each of the components in order to assess the interest rate risk exposure of their activities. The truly risky component in the net interest rate margin is the maturity transformation spread. The bank will need to trade off the expected net interest income against the following risks.

– *Parallel yield curve risk*. This source of interest rate risk stems from timing differences in the repricing of assets, liabilities and off-balance-sheet instruments. Even if we assume that the entire curve shifts up and that the total spread and its components remain the same, total net income is still at risk. Indeed, bank liabilities typically reprice earlier than assets (see Section 3.3), implying that interest expenses increase in the short run without an offsetting increase in interest revenues. For these reasons, parallel yield curve risk is also often referred to as repricing risk.

– *Non-parallel yield curve risk*. A second source of risk originates from the yield curve changing shape, i.e. inverting, flattening, steepening, etc. Short-term interest rates are more volatile than long-term interest rates, which implies that non-parallel shifts of the yield curve are not exceptional. Part of the mismatch spread component may disappear or the spread may even become negative. *Ceteris paribus*, a flattening of the yield curve is worse for net interest income than a parallel upward shift.
– *Basis risk*. A third source of interest rate risk originates from imperfect correlation between paid and received interest rate changes on different instruments with otherwise similar repricing or maturity characteristics. Basically, this source of risk originates from the fact that the loan spread and funding spread in Chart 2 are not perfectly correlated with changes in their corresponding market (Euribor) interest rates.
– *Embedded option risk*. Finally, assets, liabilities, and off-balance-sheet positions often incorporate implicit or explicit options that can lead to behavioural maturities that significantly differ from their contractual ones. The embedded options are generally exercised to the advantage of the holder, i.e. to the detriment of the bank. Instruments with embedded options include bonds with call or put provisions, mortgage loans that allow borrowers to repay the balance early for refinancing reasons, and sight and savings deposits that allow depositors to withdraw funds at any time.

3.2 Market value of equity at risk

Although the focus on net interest income is important, it is incomplete. The market value of *all* fixed rate instruments is immediately affected when interest rates change. Whether or not these changes manifest themselves immediately in earnings depends on accounting rules. While unrealised losses can temporarily be buried in historical cost accounting, they will eventually surface, usually in the form of earnings that underperform the market. The market or liquidation value perspective evaluates the interest rate risk to a bank's net worth from all interest rate sensitive portfolios across the full maturity spectrum of the bank. Regulators find the market perspective very useful, since decreases in the market value of equity can be a leading indicator of future earnings and solvency problems. It can also help in identifying risk exposures that are not evident in an analysis of short-term earnings. See OCC (1989) for a stylised example of the latter.

However, the market value approach also raises a number of relevance and reliability problems. For example, swings in the market value of an instrument that is truly intended to be held to maturity are irrelevant and could potentially generate misleading intermediary reported income changes, given that the price will be pulled back to par at maturity. Moreover, obtaining a reliable measurement is sometimes difficult when markets are illiquid, thin, or non-existent, or where complex embedded options are included. In those cases, discretionary modelling assumptions need to be made, possibly with an important valuation impact. Finally, the market approach by definition does not allow us to identify the timing of the accounting recognition of the decline in earnings.[16]

(16) These various issues are currently raised in the debate on fair value accounting (see ECB, 2004). The article "*Impact of IAS 39 on asset and liability management and banks' capital ratios*" in this Financial Stability Review tries to look ahead by assessing the likely implications of the new financial reporting standards on a stylised balance sheet.

TABLE 2 AGGREGATE BALANCE SHEET STRUCTURE OF THE BELGIAN BANKING SECTOR

(Data on an unconsolidated basis, December 2003, percentages of total assets, i.e. 880 billion euro, 1993-2003 annual average growth rates in percentage between brackets)

ASSETS			
Interbank loan portfolio		26	(+2.6)
Client loan portfolio		36	(+5.3)
Mortgage loans	8		
Other loans	28		
Securities portfolio		28	(+4.1)
Banking book	22		
Trading book	6		
Other		10	(+13.4)
Total		100	(+4.7)
LIABILITIES			
Interbank borrowing		32	(+2.3)
Deposits		47	(+4.2)
Sight deposits	10		(+10.5)
Savings deposits	15		(+10.7)
Term deposits	14		(+2.6)
Other deposits (1)	8		(–3.3)
Own equity and subordinated debt		6	(+9.6)
Other		15	(+15.0)
Total		100	(+4.7)

Source : NBB.
(1) Other deposits consist out of bank bonds (kasbons, bons de caisse) and certificates of deposit.

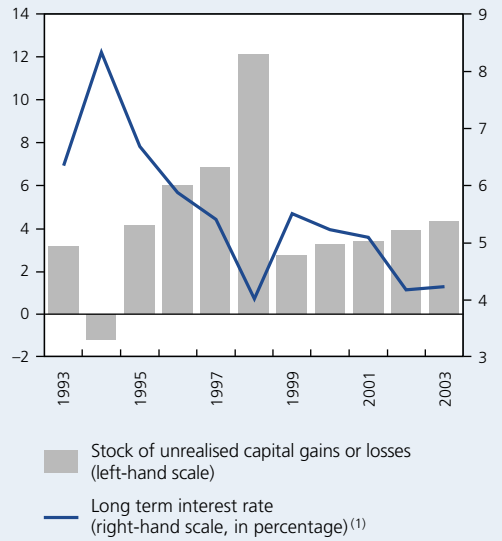
Table 2 reflects the aggregate balance sheet of the Belgian banking sector on December 2003, where the entries between brackets represent estimates of average annual growth rates in the respective balance sheet accounts over the last ten years. At the end of 2003, total assets in the Belgian banking system equated 880 billion euro or about 330 p.c. of nominal Belgian GDP. The corresponding ratio for the Netherlands is similar (345 p.c.), it is somewhat lower for France and Germany (266 p.c. and 240 p.c. respectively), but it is dramatically lower for the UK and the US (140 p.c. and 71 p.c. respectively). This suggests that the latter two economies are more market based and less bank based systems than typical European continental banks. Total assets have been growing at a rather stable pace throughout the last 10 years, attaining an average annual growth rate of 4.7 p.c.

On the more detailed level, own equity and subordinated debt and savings and sight deposits have grown relatively fast on the liability side, compared to total deposits and total liabilities. Deposits and interbank borrowing represent 80 p.c. of liabilities. On the asset side, the differences are less pronounced. We see that the loan book[17] and securities book together make up 90 p.c. of total assets.

Below, we measure the approximate impact that interest rate changes have had on the market value of some Belgian banks' assets during the last ten years. This exercise will be limited to the securities portfolio of the Belgian banking sector, since this portfolio is the only one for which marked-to-market prices are readily available. The securities portfolio represented 28 p.c. of the balance sheet total at the end of 2003.[18] About 80 p.c. of the securities portfolio corresponds to the banking book for which changes in market value are only recorded when instruments are actually realized. As this accounting method only records a fraction of the total, i.e. realised and unrealised change in market value, we used additional information available through the Belgian prudential reporting scheme to extract the difference between the book and market value of securities in the banking book portfolio. This yields a measure of the hidden cumulative gains or losses in the banking book portfolio. By adding the yearly variations in the total unrealised capital gains to the yearly realised capital gains on the banking book, we obtain a measure of the total yearly changes in the market value of the banking book portfolio (See Chart 3). If we map the cumulative gains or losses against the long interest rate, we obtain a strong negative correlation. This is confirmed by a regression of total (i.e. realised and unrealised) capital gains in the banking book on the long interest rate (using quarterly data from 1993:Q1 to 2003:Q4). The R-squared is 43 p.c. and the coefficient on the long interest rate is statistically and economically

CHART 3 CUMULATIVE UNREALISED CAPITAL GAINS OR LOSSES IN THE BANKING BOOK

(Data on an unconsolidated basis, billions of euro unless stated otherwise)



Source : NBB.
(1) Average actual yield for loans with 6 years remaining to maturity.

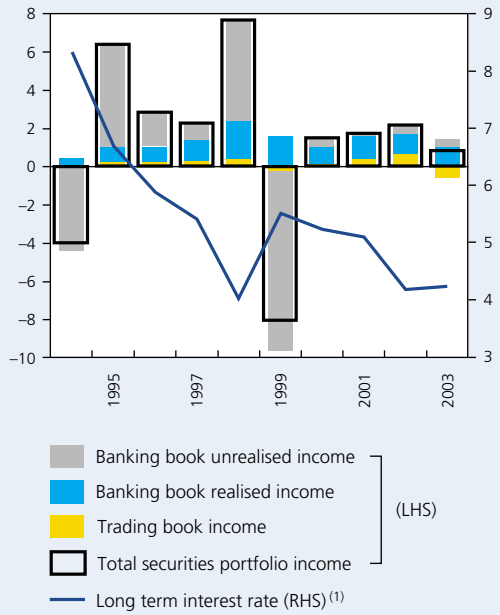
significant. Every 100 basis points increase in the interest rate leads to a decrease of 1.5 billion euro in the cumulative capital gain, with a 95 p.c. confidence interval of [–2.1 billion, –0.98 billion].

If we want to measure the market value change of the *total* securities portfolio, we have to add the value of changes in the trading book. Chart 4 compares the three components of securities portfolio income, i.e. realised income in the banking book, unrealised income in the banking book, and trading book income. From the chart, the following observations can be made. First, total securities portfolio income is very volatile. The average value is 1.4 billion euro with a standard deviation of 4.7 billion euro. Second, the unrealised income in the banking book is by far the most volatile component, both in levels and proportionally (unrealised banking book income varies between 10 p.c. and 84 p.c. of total securities portfolio income[19]). Third, the average realised income in the banking book is 1.1 billion, whereas it amounts to 150 million for

(17) On average about 65 p.c. of the loan book is fixed-rate versus 35 p.c. variable-rate. Differences across individual banks can be substantial to the extent that variable-rate loans dominate in the loan books of some banks.
(18) This proportion is much higher than in most other EU countries, illustrating the important role played by Belgian banks in the financing of the federal government.
(19) We have disregarded the three years with negative components.

CHART 4 DIFFERENT SOURCES OF SECURITIES PORTFOLIO INCOME

(Data on an unconsolidated basis, billions of euro)



Source : NBB.
(1) Average actual yield for loans with 6 years remaining to maturity.

the trading book and to only 115 million for unrealised banking book income. While the unrealised banking book income has been positive for 8 out of the last 10 years, it was negative in 1994 and 1999. The unrealised losses in the banking book can be seen to make up the bulk of the securities portfolio loss in those years. The long-term interest rate dynamics are superimposed and can be seen to have played an important role. Note also that, despite the fact that the interest rate increase was smaller in 1999 than in 1994, we observe a larger unrealised banking book loss in 1999. Two potential explanations can be given for this outcome. First, given the convex relationship between prices and yields, the price sensitivity (duration) of a given portfolio increases for lower levels of interest rates. Interest rates were indeed lower in 1999 than in 1994. Second, there is a volume effect in the sense that the volume of net assets that reprice in one year or later was substantially higher in 1999 than in 1994.

(20) Again, we make reference to the article in this Financial Stability Review "*Impact of IAS 39 on asset and liability management and banks' capital ratios*" which assesses the total balance sheet effects of financial reporting according to *IAS 39* rules.

Of course, the discussion above only concerns the securities portfolio. Total market value effects on the asset side may be bigger, although there may also be some limited compensation on the liabilities side of the balance sheet.[20] In the next section, we assess the interest rate risk exposure in the Belgian banking system more generally.

3.3 Aggregate gap report for the Belgian banking sector

Repricing tables allocate assets, liabilities, and off-balance-sheet instruments into time bands according to the time remaining to repricing. They allow us to form a more refined image of interest rate risk exposure and can also be used to study the two measures of interest rate risk mentioned above, net interest income at risk and market value of equity at risk.

By measuring the net assets (liabilities) that remain after subtraction of liabilities per time band, gap reports are constructed from repricing tables. *Gap reports* are used to measure net interest income at risk and to indicate the timing of the risk. Since a bank earns a return on its assets and has to pay interest on its liabilities, net interest income is expected to change by the mismatch times the expected interest rate change. Importantly, gap reports can also be used to evaluate the effects of changing interest rates on the market value of equity. *Duration gap reports* analyse the impact of a change in interest rates on the market value of a bank's equity. To this end, the mismatches are accorded risk weights that reflect the sensitivity of the net positions in each time-band to a given unexpected change in interest rates. Finally, the weighted mismatches are added together and this aggregated number is typically compared to a measure of capital. In practice, a proxy of modified duration is used to compute the risk weights. It is clear that if interest rates increase unexpectedly, the value of both assets and liabilities will drop, so that the interest rate sensitivity of the assets and liabilities will determine whether or not equity will increase, decrease, or stay the same.

The weaknesses of repricing tables and gap reports are well-documented:

- There are potential mismatches *within* each time band, hence significant risks may remain hidden when the time-to-repricing time bands are large.
- The time value of money and the payment of taxes and coupons is ignored.
- In reality, the yield curve often shifts in non-parallel ways and is regularly upward sloping, while a parallel shift and a flat yield curve is implicitly assumed in assessing the impact on market value of equity (see Box 1).

– The risks from embedded options (early loan repayments and deposit withdrawals) are typically not captured.
– Basis risk is not taken into account.
– The underlying assumption is that no new business is generated and that all maturing assets and liabilities are reinvested in the same time-band.

Clearly, each of the above points potentially biases the interest rate risk measurement. Despite these weaknesses, however, gap reports remain a consistent and simple means by which banks and supervisors can assess possible mismatches within banks' balance sheets. Moreover, it is possible to accommodate some of the above weaknesses, for example by constructing different gap reports each corresponding to a specific interest rate dynamics scenario. Associated assumptions can then be made about the repricing characteristics of assets, liabilities, and off-balance-sheet instruments and about early loan repayments and deposit withdrawals. (21)

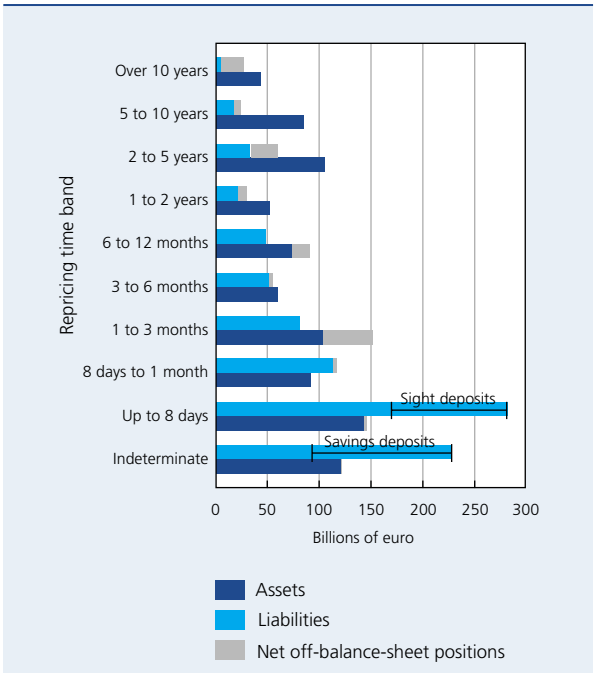
Chart 5 reflects the aggregate repricing table for the entire Belgian banking system at the end of December 2003. (22) Ten time-to-repricing time bands (hereafter, time bands) can be distinguished from top to bottom. At the long end (top of Chart 5) the "over 10 years" time band records all assets, liabilities, and off-balance-sheet instruments that reprice more than 10 years in the future. At the short end there is the "up to 8 days" time band recording all assets, liabilities, and off-balance-sheet instruments that reprice within 8 days. Sight deposits are by default classified in the shortest time band liabilities (91 billion euro in total, i.e. 32 p.c. of "up to 8 days" liabilities).

Apart from these nine specific time bands, there is an important "indeterminate" time band (bottom of Chart 5), containing all assets and liabilities that cannot readily be classified in any of the nine specific time bands. The bulk of the indeterminate liabilities is made up of savings deposits (134 billion euro, i.e. about 60 p.c. of total indeterminate liabilities), accrued charges and deferred income (23 p.c.), and own capital (14 p.c.), while deferred charges and accrued income (52 billion euro, i.e. 43 p.c. of total indeterminate assets), advances in overdrafts (15 p.c.), and fixed assets (25 p.c.) account for the bulk of the indeterminate assets. The size of the indeterminate time band is certainly not negligible, being the second largest on the liabilities side (after the "up to 8 days" time band), the third largest on the asset size, and the second largest in terms of gap (after the "up to 8 days" time band).

The structure of liabilities and assets across the time band spectrum suggests that Belgian banks fund a net amount of long assets with a net amount of short and "indeterminate" liabilities. Although off-balance-sheet instruments (interest rate swaps, forward rate agreements, interest options) have grown by an annual average rate of 16.5 p.c. over the last ten years, Chart 5 makes clear that their net positions do not fundamentally change the asymmetry in the balance sheet. While a part of the interest rate risk exposure can be seen to be hedged by means of net off-balance-sheet instruments, there remains a substantial mismatch between the repricing characteristics of banks' assets and liabilities. Net off-balance-sheet positions are used to decrease (hedge) the existing on-balance mismatches for time bands "one to two years" and longer, while their use typically increases the existing on-balance mismatches below one year (notably the "6 to 12 months" and "1 to 3 months" time bands).

CHART 5 AGGREGATE REPRICING TABLE OF THE BELGIAN BANKING SECTOR (DECEMBER 2003)

(Data at the end of december 2003 on an unconsolidated basis, billions of euro)



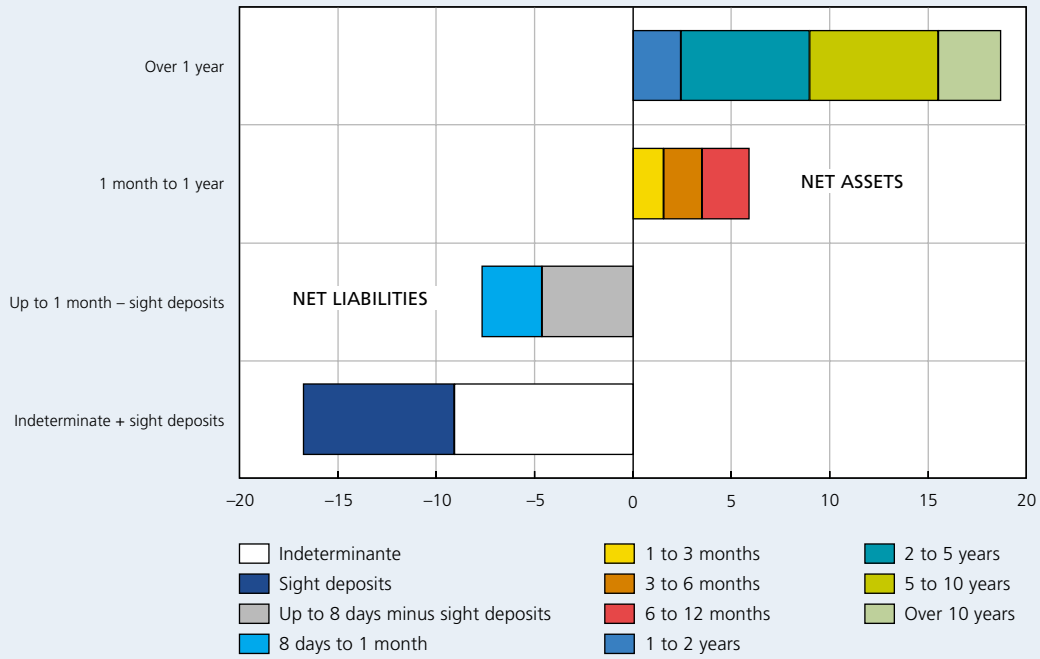
Source : NBB.

(21) For example, a capped adjustable rate mortgage with annual repricing could be considered to be fixed rate in a strongly rising interest rate environment and a one-year repricing asset in a declining rate environment.

(22) Downloaded from the Belgian prudential reporting scheme. The following data limitations should be mentioned. First, these data are not gathered at the consolidated bank account level, but only on a solo basis. Second, the data cannot distinguish between trading, banking and loan books. Given that trading book positions and mismatches can be rather quickly reversed (unwound), the observed mismatch will be sensitive to overestimation bias. However, in Table 2 we documented the fact that the size of the trading book positions is relatively small compared to the balance sheet total, hence the bias is likely to be small as well.

CHART 6 SIMPLIFIED AGGREGATED GAP REPORT FOR THE BELGIAN BANKING SECTOR

(Average aggregated gap report, from the first quarter 1993 to the last quarter 2003, percentages of total assets)



Source : NBB.

A rearrangement of the time bands sheds more light on the repricing transformation activity of Belgian banks. Chart 6 presents the simplified gap report, aggregating on- and off-blance-sheet positions and grouping slected time band, to provide a clearer view of the repricing transformation role of banks (average gap report 1993 :Q1-2003 :Q4). Given that the two middle time bands approximately offset each other, the chart suggests that Belgian banks mainly finance net long assets such as mortgages and Belgian government bonds with sight deposits and net indeterminate liabilities (which roughly equal total savings deposits in size). Of course, the two middle bands do not offset each other exactly and some of the net liabilities up to one month may finance net long assets over one year. Also, the net indeterminate liabilities do not necessarily equal savings deposits. But if one is willing to make these assumptions for simplicity, two separate areas in the repricing schedule emerge.

The two inner time bands in Chart 6 reflect the activity of banks in money markets and with large corporates (time advances, time deposits) and suggest that the interest rate risk exposure for the positions until one year is rather limited. The two outer time bands in Chart 6 reflect the core business bank activity of attracting deposits to finance long-term assets. While the two outer time bands appear to suggest a large mismatch, the key to assessing the exposure to interest rate risk requires computing the *effective* or *behavioural* duration of sight and savings deposits. Despite a contractual maturity of basically zero for sight and savings deposits (being withdrawable on demand), both these types of deposits are referred to in the literature as non-defined-maturity deposits, since their effective maturity is not unambiguously defined, and is likely to substantially exceed the contractual maturity in normal market circumstances.

How should the effective duration of deposits be treated? Should deposits be tranched out over a number of months, quarters, or years or should the stable base be assigned to the long-term time band and the residual to the overnight time band ? The answers to these important questions will depend on the view one holds, and they have led to controversy between standard setters, the industry, and supervisors in the recent IAS 39 debate. Indeed, in their risk management practices, bankers assume this behavioural duration to be relatively long (typically several years), reflecting a going concern view of the bank that net long assets are financed with a stable

base of core interest rate insensitive deposits[23]. Instead, some standard setters argue that the behavioural duration is substantially smaller in certain interest rate scenarios and that it lies closer to the contractual duration of sight and savings deposits. In the extreme, standard setters consider all balances to be overnight and very rate sensitive, reflecting a liquidation view of the bank. Prudential supervisors fall mostly in between these two extreme viewpoints. For example, they argue that in today's low interest rate environments deposits partially reflect funds sheltered from a less buoyant stock market. As interest rates increase, these funds will move to more productive investments, either in or outside of the bank. This suggests that the assumptions about the stable portion of deposits should be carefully reviewed and attention should be paid so that the risk sensitivity of deposits is not understated.

In the end, the allocation of instruments with an undetermined time to maturity to a specific time band remains an art as well as a science.

3.4 Deposit accounts and their embedded options

Deposit accounts constitute an important portion of the funding sources of a bank (see Table 2 above). Hence, both their *volume* and *pricing* potentially has a large impact on the interest rate risk exposure of a bank. While a deposit account looks like a fairly simple financial instrument, embedded options are attached that render their modelling and valuation complex.[24]

First, the depositor holds the option to withdraw all or part of the balance in the account at par. This withdrawal option poses a significant risk for any bank, given that it is generally exercised to the advantage of the holder, i.e. to the detriment of the bank. For example, when interest rate increases make depositors withdraw some of their funds to invest them at higher returns (and in the case where these withdrawals exceed reserves), a bank may need to sell off some of the long assets at a considerable loss or replace the cheap deposit financing with more costly alternatives. Of course, when a bank expects higher savings deposits withdrawals in the future due to higher interest rates, it can defend itself by buying put options or caps on the banking book portfolio securities. While the annual growth rate of savings deposits over the last ten years has been a sound 10.7 p.c. on average (exceeding the 4.7 p.c. annual average growth rate of total Belgian liabilities by far), the total amount of savings deposits between December 1999 and December 2000 did decrease by 5.9 billion euro, i.e. –5.9 p.c. of total savings deposits at that time.

Second, banks hold the option to set the interest rate that they pay to savings deposits holders, i.e. the *deposit rate*. They change this deposit rate at their own discretion, its movements being largely driven by competition and internal cost factors.[25] Stylised facts about deposit rates include the following (Van den Spiegel (1993) and O'Brien (2000)):

- Below-market rates are typically paid even after accounting for non-interest costs net of fees.
- Deposit rates exhibit substantial stickiness.
- Deposit rate adjustments tend to be asymmetric, displaying rigidity when market rates are increasing (so that rate spreads become larger), and flexibility when market rates are decreasing (so that rate spreads become smaller).

Deposited funds below a certain threshold are risk-free, given the existing Belgian deposit insurance scheme.[26] Yet, they pay rates that are typically lower than the corresponding risk-free rates. The market value of a financial instrument that pays less than the rate on a comparable-risk investment will reflect this arbitrage opportunity. Normally, such arbitrage opportunities are quickly eliminated by competition as other banks enter this lucrative market and start to bid up the price. However, the market for deposit accounts is not an active one like that for other liabilities such as bonds or equity, and substantial market power exists in retail deposit markets (Hutchison and Pennacchi (1996), Ausubel (1991) and Van den Spiegel (1993)). There are also regulatory barriers to entry, since one cannot simply start issuing deposits to arbitrage away the profit (Jarrow and van Deventer (1998)). The spread between what a bank might receive from investing the deposited funds at the risk-free rate and what a bank has to pay to the deposit holders (the deposit rate and the servicing cost) is called an economic rent in the literature (see Jarrow and van Deventer (1998)). As a result of the existence of economic rents, the market value of deposit account balances typically lies below par (Selvaggio (1996)). In other words, each

(23) The banks argue that the dispersion of savers reduces the likelihood of a sudden withdrawal in the absence of a systemic crisis, and argue that deposit insurance and emergency liquidity assistance allow to avoid such a systemic crisis. This article does not deal with the liquidity risk exposure of banks, but focuses only on the interest rate risk exposure.

(24) Moreover, deposit accounts also offer important payment services to their holder which are equally difficult to price.

(25) Note that the maximum retail deposit rate in Belgium has been regulated and legally capped at 4 p.c. from 1986 onwards. This cap concerns the base rate only, and not the growth premium (that is paid on every new amount left on an account during a well-defined period) nor the loyalty or fidelity premium (that is paid to each deposit left on an account during a specified period). These premia are also capped at 2 p.c. Note that the deposit rate on sight deposits balances is currently very low, 0.5 p.c., and typically remains unchanged, irrespective of market rate dynamics.

(26) In Belgium, deposit balances enjoy a state guarantee up to a specific coverage limit per customer of 20,000 euro, which is applied to the sum of a depositor's accounts at a failed bank (but no longer to each account separately). For a historical review of deposit insurance in Belgium and in Europe, see Garcia and Prast (2004).

euro of generated deposits creates shareholder value for the bank.[27]

To assess the behavior and cash flows of financial instruments with embedded options in different interest rate environments, relatively more complicated approaches need to be applied to a more detailed breakdown of financial instruments. Box 3 provides a brief literature review. Embedded options complicate considerably the assessment of the interest rate risk exposure of the deposit-taking institution as a whole.[28] They also raise significant challenges for those needing to supervise the risk in banks' balance sheets. In fact, the complexity of measuring the impact of embedded options in deposit accounts was one factor in the decision not to adopt formal capital requirements for bank's non-trading positions (Fed (1995)). The general supervisory approach to the measurement of interest rate risk is discussed in Section 4, to which we now turn.

4. Supervision of interest rate risk and the Basel II Accord

Ultimately, it is up to the capital owners of the bank to decide how much interest rate risk exposure they would like to assume. The responsibility of the supervisory authorities is to protect depositors and debt holders against excessive risk-taking by the bank. This section describes the general *supervisory framework* for measuring and monitoring interest rate risk exposures of banks.

(27) The present value of all future economic rents is non-zero. Indeed, banks typically pay premia when acquiring core deposits from other banks. A US study in Bank Mergers & Acquisitions (March 1995 issue) shows evidence of 49 core deposit transactions completed between February 4 and March 3 1995, and reports that the average premium paid was 10.17 p.c. of deposit balances (ranging from a low of 0.3 p.c. to a high of 27.1 p.c.).

(28) Within the framework of this article, we have chosen not to discuss other important balance sheet items with embedded options, such as bonds with call or put provisions and mortgage loans that allow borrowers to repay the balance early, with or without penalty. Mortgage early repayments occur for both economic and demographic reasons. Economic reasons may include interest rates decreasing sufficiently for refinancing to become profitable and demographic reasons may include home-owners moving to another region, divorcing, trading-up to a bigger house, or dying. In the US, the rate of demographic early repayments hovers around a constant percentage (about 6 p.c. per year), while the rate of economic early repayments can be substantially larger, up to 50 p.c. per annum when interest rates drop by 500 basis points or more (Uyemura and van Deventer, 1994).

Box 3 – Deposit account modeling

In this Box, we briefly review the literature on deposit account modeling. With respect to the setting of deposit rates, two modeling approaches are used. It is either assumed that the bank is able to reset the deposit rate each period to maximise the present value of the balances (as in Hutchinson and Pennacchi (1996)), or that it resets the deposit rate periodically to obtain a target margin (as in Selvaggio (1996)). Van den Spiegel (1993) presents anecdotical evidence that deposit rate setting was used by Belgian banks to stabilise the global interest rate margin of the bank, so as to safeguard their important economic role as maturity transformers. Competition amongst banks shifted to providing services to the customers, which in turn led to the phenomenon of overbanking.

With respect to the modeling of deposit balance dynamics and their sensitivity to interest rate changes, there are roughly two methodologies available in the public domain. In the *option-adjusted spread* approach (Selvaggio (1996), OTS (2001) and Goosse et al. (1999)) expected cash flows are discounted using a discount rate that reflects their riskiness, due to the option risk. The main concern is to estimate the appropriate spread, referred to as the option-adjusted spread (OAS), which is added to the riskfree rate such that the present value of expected cash flows calculated over many different interest rate paths equals the observed market value. The market value of the deposit account is its face value minus the discounted present value of its economic rents. Typically the discount rate is assumed to be LIBOR plus the option-adjusted spread.

The idea in the *contingent claim* or *arbitrage-free valuation* approach (see Hutchison and Pennacchi (1996), Jarrow and van Deventer (1998), Janosi et al. (1999), O'Brien (2000), and Dermine (2003)) is to discount at the risk-free rate, but after adjusting the expected cash flows by subtracting a risk premium. Put differently, certainty-equivalent cash flows are discounted at the risk-free rate. The embedded options are modeled explicitly using option-pricing techniques. Future deposit account balances are a function of the path of future interest rates. The present value is calculated for a stream of cash flows over different interest rate paths, taking into account how the cash flows will vary as interest rates change. This is usually accomplished using a Monte Carlo simulation.

Both approaches always make assumptions about the specific arbitrage-free term structure models that is used for the simulation of market interest rate uncertainty (Vasicek (1977), Heath et al. (1992), Cox et al. (1985), etc.) and about how the deposit rate (symmetric or asymmetric) and deposit balances react with respect to changes in market interest rates. The deposit rate and deposit balance equations are typically estimated by means of a parsimonious autoregression. Ellis and Jordan (2001) give an elaborate review of the literature and summarize the findings with respect to duration and premia estimates. The Table below, which is a reflection of their work, shows that premia and duration estimates differ widely over the different studies and over the different kinds of deposit accounts.

TABLE 1 ESTIMATED DEPOSIT ACCOUNT DURATION AND DEPOSIT ACCOUNT PREMIA

	Sample used	Sample period	Transactions account		Money market deposit account (MMDA)	
			Premia	Duration	Premia	Duration
Hutchison and Pennacchi (1996) . . .	200 banks	1986-1990	6.6	6.7	7.0	0.4
O'Brien (2000)	100 banks	1983-1994	15.3	1.1	10.9	0.5
Janosi et al. (1999)	Aggregate FED data	1988-1995	2.7	2.4	n.a.	n.a.
OTS (2001)	Thrifts	1988-2001	7.0	2.8	2.0	1.3

Source : Ellis and Jordan (2001).
(1) Table entries are medians from the listed studies. The premia are expressed as percentage of the face value.

Most large Belgian banks seem to use a *replicating portfolio* approach to model the dynamics and price sensitivity of their deposits accounts.[1] The idea here is to choose the optimal portfolio of securities, financed by savings deposits, so that an optimal trade off is achieved between the resulting average margin, the volatility of the margin, and the prediction error made with respect to the *ex post* margin. The optimal trade off is chosen by the Asset and Liability Committee of the bank. Van den Spiegel (1993) suggests to shorten the duration of the replicating portfolio when interest rates are becoming abnormally low and high, i.e. when spread and volume risks are increasing, respectively. The duration of the replicating portfolio can be lengthened when interest rates have mean-reverted to normal levels.

(1) Goosse et al. (1999) point to some difficulties in the replicating portfolio approach and conclude that the market value of deposits accounts displays convexity, and that this convexity cannot be replicated by a portfolio of government zero coupon bonds.

Under current Basel I regulation, a bank is required to set aside capital to cover its credit and market risks, where the latter includes the interest rate risk in the trading book (but not in the banking book) (BIS, 1996). With respect to the trading book, a bank needs to hold sufficient capital to cover the sensitivity of market value of equity to a specific and unexpected change in interest rates. The unexpected change is defined as a shock of 100 bp at the shortest time band, gradually declining to a 60 bp shock at the longest time band. The Basel II Accord (BIS, 2003a) consists of a three Pillar approach[29]. Next to a more sophisticated and risk-sensitive treatment of credit risk and a status quo for the treatment of market risk, Pillar I also considers operational risk. Pillar I is basically a refined and extended version of the Basel I regulation and like Basel I also imposes a formal capital requirement on the interest rate risk that originates from the trading book. Pillar II of Basel II invites bank regulators to control the level of interest rate risk in the banking book (next to other sources of risk). It urges supervisors to look for the banks that are *outliers* with respect to their interest rate risk exposure in the banking book. An outlier is defined as a bank that would lose more than 20 p.c. of its Tier 1 and

(29) Pillar III is about market discipline and reporting requirements and is outside the scope of this article.

Tier 2 capital due to a specific stress scenario (200 basis point shift of the flat yield curve or an equivalent scenario). Basel II does not impose specific rules about the behavioural assumptions that underlie the above test. Specifically, it does not impose detailed rules on how to treat deposit accounts. National supervisors will have the discretion to require additional capital or a reduction in the risk profile by imposing a hedge (for example, impose the purchase of a cap) on outlier banks that run excessive banking book interest rate risk.

The Belgian supervisory authority, i.e. the Banking, Finance, and Insurance Commission (BFIC), employs a threefold approach to the supervision of interest rate risk in the banking book. *First*, the BFIC computes interest rate risk ratios on a quarterly frequency and based on gap reports of individual banks on a solo basis, where the ratios compare the sum of weighted net mismatches over all time band against measures of capital and earnings. The weights applied to the gaps or mismatches are proxies for the modified duration of the different net asset and liability portfolios. Banks with ratios that exceed certain thresholds are defined as outliers. The resulting ratios are used as detection devices only and not as thresholds that automatically trigger extra capital requirements. The supervisor is well aware of the possible drawbacks and of the potential risks that might remain concealed when using repricing tables and gap reports. However, gap reports remain simple tools that may be used to assess possible mismatches within banks' balance sheets. The main advantage of the existing approach is its consistent comparison across banks. *Second*, outliers trigger on-site inspections to check more accurately with the bank's own data whether or not the bank is exposed to excessive interest rate risk in the banking or trading book. Possibly further prudential measures can be and have been taken, following constructive dialogue between the BFIC and the bank under consideration. The BFIC asks the concerned banks to compute the duration of their assets and liabilities using detailed product information about cash flows and time of maturity. In addition, they provide the banks with specific assumptions and parameters, amongst others with respect to the assumed interest rate change and the duration of savings deposits[30]. For those banks where a specific duration gap threshold is exceeded between assets and liabilities, a specific extra capital charge is required by the BFIC. *Third*, the BFIC also regularly assesses the adequacy and effectiveness of a bank's interest rate risk management and the quality of risk measurement, monitoring and control functions, based on general principles issued by the Basel Committee of Banking Supervision (BIS, 2003b), of which a selection is reproduced in Box 4.

5. Concluding remarks

Banks finance their assets by means of liabilities with different maturity, duration, and repricing characteristics. This transformation activity of banks meets an important need in any economy, but potentially leads to the exposure of a bank's net interest income and market value of equity to unexpected changes in interest rates. Ultimately, banks do so because they expect to earn an extra return or risk premium from lending at a long rate and borrowing at a short rate (yield spreads are incomplete measures of excess returns and neglect the riskiness behind mismatching strategies). Moreover, because no bank is able

(30) The BFIC asks banks to assign the savings deposits to the "6 to 12 month" time band. For its own interest rate risk assessment, the BFIC in fact considers several assumptions about the risk weights, the distribution of savings deposits across the repricing schedule, and the assumed interest rate shock, where it takes care to remain consistent over all institutions in each scenario.

Box 4 – Principles to be used by supervisors in evaluating the interest rate risk management of banks

The principles below represent a selection of the 15 principles that have been issued by the Basel Committee on Banking supervision (BCBS, 2003b) in order to help supervisors in their assessment of the adequacy and the effectiveness of a bank's interest rate risk management, in assessing the banking book interest rate risk exposure, and in developing an adequate supervisory response to that risk.

Risk measurement, monitoring and control functions

- It is essential that banks have interest rate risk measurement systems that capture all material sources of interest rate risk and that assess the effect of interest rate changes in ways that are consistent with the scope of their activities. The assumptions underlying the system should be clearly understood by risk managers and bank management.
- Banks must establish and enforce operating limits and other practices that maintain exposures within levels consistent with their internal policies.

– Banks should measure their vulnerability to loss under stressful market conditions – including the breakdown of key assumptions – and consider those results when establishing and reviewing their policies and limits for interest rate risk.
– Banks must have adequate information systems for measuring, monitoring, controlling and reporting interest rate exposures. Reports must be provided on a timely basis to the bank's board of directors, senior management and where appropriate, individual business line managers.

Information for supervisory authorities
– Supervisory authorities should obtain from banks sufficient and timely information with which to evaluate their level of interest rate risk. This information should take appropriate account of the range of maturities and currencies in each bank's portfolio, including off-balance-sheet items, as well as other relevant factors, such as the distinction between trading and non-trading activities.

Capital adequacy
– Banks must hold capital commensurate with the level of interest rate risk they undertake.

Supervisory treatment of interest rate risk in the banking book
– Supervisory authorities must assess whether the internal measurement systems of banks adequately capture the interest rate risk in their banking book. If a bank's internal measurement system does not, banks must bring the system to the required standard. To facilitate supervisors' monitoring of interest rate risk exposures across institutions, banks must provide the results of their internal measurement systems, expressed in terms of the threat to economic value, using a standardised interest rate shock.
– If supervisors determine that a bank is not holding capital commensurate with the level of interest rate risk in the banking book, they should consider remedial action, requiring the bank either to reduce its risk, to hold a specific additional amount of capital, or a combination of both.

to systematically outguess market expectations, it is risk premia and not interest rate expectations that should drive the maturity and repricing mismatches of banks. However risk premia are not stable through time, but fluctuate widely in ways that cannot easily be linked to variables such as the level of current interest rates and economy-wide variables. While the statistical properties of risk premia can be captured by modern state-of-the-art term structure models, an economic explanation is still lacking and stands as a challenge for finance researchers.

This paper has presented estimates for the interest rate risk exposure of the aggregate Belgian banking sector, both from a liquidation perspective and going concern perspective. The average ratio of net interest income to total income seems to have declined slowly over the last ten years reflecting disintermediation, although important differences between large, medium-size, and small banks can be distinguished in the dynamics and level of this ratio. In line with results for other countries, this paper finds that the statistical evidence about the interest rate determinants of changes in Belgian net interest income is not clear-cut, possibly reflecting the fact that net interest income captures a lot more than what is generated by the maturity transformation role of banks. The impact of current accounting practices that allow banks to smooth their income through shifting securities from the trading book to the banking book at their discretion might also be important. In this respect, one of the objectives pursued by IAS 39 is to increase the transparency of banks' risk-taking.

The repricing gap report of the aggregate banking sector allows us to identify the main interest rate risk exposure of Belgian banks. The inner time bands reflect the activity of banks in the money market and with large corporations and suggest a rather limited interest rate risk exposure, notwithstanding the fact that off-balance-sheet instruments typically increase the existing mismatch in this part of the repricing schedule. The outer time bands of the gap report reflect the core activity of Belgian banks of taking sight and savings deposits to finance long term assets. The interest rate risk exposure is sizeable, despite the fact that off-balance-sheet instruments typically reduce the level of the individual on-balance-sheet mismatch in this range of the repricing schedule. To the extent that deposit balances have a behavioural duration that significantly exceeds their contractual duration, interest rate risk exposure may still be limited. However, in today's low interest rate environment, deposits at

least partially reflect funds sheltered from a less buoyant stock market. As interest rates increase, these funds may move to more productive investments either in or outside of the bank, leaving the bank exposed to higher financing costs. In this respect, assumptions about the stable portion of deposits deserve careful review, so as not to understate the risk sensitivity of savings deposits in specific interest rate scenarios.

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Impact of IAS 39 on asset and liability management and banks' capital ratios

David Guillaume

1. Introduction

By 2005, credit institutions presenting consolidated accounts will most probably have to apply International Accounting Standards (IAS), and more particularly IAS 39 on the recognition and measurement of financial instruments. (1) The introduction of IAS 39 substantially modifies the accounting framework within which credit institutions have to work. The standard requires fair value accounting for all forward transactions in interest rates (hereafter "derivatives") and for a considerable proportion of the interest-bearing assets, and even liabilities. These financial instruments are often recorded "at amortised cost" under the Belgian accounting rules. IAS 39 will therefore imply higher volatility in reported net income (profit and loss account) and equity of credit institutions.

The likely increase in the volatility of reported net income and equity is generating much discussion among credit institutions. (2) The latter argue that this volatility is not necessarily representative of their interest rate risk, so that it could mislead annual accounts users. One of the essential concerns expressed by the banking sector is that banks want to be able to limit the volatility of the reported net income by continuing to manage their interest rate risk (hereafter referred to as their "ALM" position) on the basis of the economic risk, rather than according to the accounting impact of changes in interest rates. Indeed, the objective of interest rate risk management, or ALM, should be to manage the volatility of the market value of equity and of the future interest rate margin of a credit institution. (3)

Another point of concern for the sector is the volatility of the accounting equity caused by IAS 39 and the way in which it will affect the regulatory capital ratios. Regulators have yet to decide on which basis to set minimum capital requirements, hence the impact on the regulatory capital ratios will depend on the policies to be adopted by the regulators on this matter.

This article does not intend to list the arguments for or against the new IAS standards. Rather, its objective is to demonstrate how a credit institution may manage the volatility of its reported net income without changing its asset and liability management (ALM) and what the implications of IAS 39 may be for banks' capital ratios.

The remainder of the paper is organised as follows. Section 2 is devoted to a description of the main implications of IAS 39. Section 3 illustrates the impact of IAS 39 on ALM. Section 4 discusses the impact of IAS 39 on the calculation of regulatory capital. Section 5 presents the main conclusions.

(1) In case IAS 39 is not adopted at the European level, Belgian credit institutions will still be allowed to apply it on a voluntary basis. However, it seems very likely that the EU endorsement process will be finalised in time. The formal steps and timetable of the EC endorsement process are explained in ECB (2004a).

(2) See Chisnall (2000) and Joint Working Group of Banking Associations on Financial Instruments (1999) for the arguments that have been raised by the industry against more fair value accounting in banks' financial reporting.

(3) This article focuses on market value of equity at risk and not on net interest income at risk. For a more conceptual discussion of these concepts and Belgian banking sector evidence, see the article "*Interest Rate Risk in the Belgian Banking Sector*" in this Financial Stability Review.

2. Main implications of IAS 39

IAS 39 may change reported net income and equity of credit institutions, compared with the outcome under current Belgian accounting standards. With regard to the financial instruments generally taken into account in the ALM of credit institutions, the three main IAS 39 implications are as follows:[4]

- Derivatives used for ALM purposes are considered hedge instruments. Their results are currently recorded on an accrual basis. Under IAS 39, derivatives are regarded as trading transactions, which means that they are recorded at fair value, with changes in fair value being recognised in net income. The problem is that derivative instruments are often used to hedge interest rate risks relating to assets and liabilities valued at amortised cost. Recording the hedging instrument at fair value and the hedged item at amortised cost will effectively introduce artificial volatility in banks' net income.
  However, some of these derivatives can be designated as "effective hedge instruments", either in the form of fair value or cash flow hedges. Fair value hedges protect against fluctuations in the value of financial instruments, while cash flow hedges protect against volatility of revenues. These derivatives will also have to be stated at fair value with changes in fair value recognised in net income for fair value hedges, or directly in equity in the case of cash flow hedges. The hedged items of fair value hedge derivatives are also recorded at fair value with changes in fair value reported in net income. The problem here is that the extensive hedge documentation requirements are found to be prohibitive and are to be implemented instrument by instrument. This practice would fail to reflect banks' current risk management practice of hedging the net exposure of portfolios of financial instruments.
- Assets which cannot be classified in any of the categories of "loans", assets held to maturity, or trading assets will have to be recorded in the residual category "Available for Sale" (AFS). AFS assets will be recorded at fair value with changes in fair value being recognised in equity. In practice, a large part of the current investment portfolio in interest-bearing securities held by credit institutions will be placed in this category, instead of that of assets held to maturity, insofar as banks regularly sell their investment securities before maturity in order to realise capital gains and to manage their interest rate risk positions. These securities are currently recorded at amortised cost.
- Under the "fair value option" offered by IAS 39, a bank will be able to record any interest-bearing asset or liability at fair value with changes in fair value being recorded in net income. This fair value accounting method will have to be adopted immediately on acquisition or creation of the asset or liability. Consequently, loans or deposits may be recorded at fair value. In the case of deposits with no fixed maturity, mainly savings accounts and demand deposits which constitute the "core deposits" of traditional banks, IAS 39 assumes that the fair value is equal to the legally owed amount.

3. Illustration of the impact of IAS 39 on asset and liability management

3.1 Set up

A simplified example can illustrate the impact of IAS 39 and the various solutions which credit institutions might envisage for limiting the volatility of reported net income, without modifying their interest rate risk position or management. The simulation measures how a 1 p.c. change in interest rates affects reported net income and equity of a credit institution in various accounting environments, namely:

- Current Belgian accounting rules: table 1.
- IAS accounting rules without use of the fair value option: tables 2 and 3.
- IAS accounting rules with use of the fair value option: table 4.

The example concerns a typical ALM balance sheet structure for a Belgian credit institution, comprising an interest-bearing commercial balance sheet (deposits and loans), an investment portfolio of interest-bearing securities, and a portfolio of derivatives used for ALM.[5] The structure of each table is the same, with column 1 showing the reported book value of the assets and liabilities, column 2 the market value[6], column 3 the difference between the reported value and the market value, and column 4 the sensitivity of the market value to an increase or decrease in interest rates.

3.2 Financial reporting in the current Belgian accounting environment

In the current Belgian accounting environment, assets and liabilities on the ALM balance sheet are measured at amortised cost, and interest income is recorded on an accrual basis. ALM derivatives are only mentioned

(4) For a general review and broader implications of IAS 39, see ECB (2004b), Mathérat (2003) and Jackson and Lodge (2000).

(5) The IAS standards will likely have only a minor impact on items other than those included in ALM.

(6) For simplicity, we have assumed that the market value is equal to the fair value.

TABLE 1 FINANCIAL REPORTING IN THE CURRENT BELGIAN ACCOUNTING ENVIRONMENT

	Balance sheet at time t				Balance sheet when interest rates increase by 1 p.c.			Balance sheet when interest rates decrease by 1 p.c.		
	Book value	Market value	Difference (1)	Interest rate sensitivity (2)	Book value	Market value	Difference (1)	Book value	Market value	Difference (1)
ASSETS										
Loan portfolio	13,600	14,160	560	510	13,600	13,650	50	13,600	14,670	1,070
Securities portfolio	10,500	11,500	1,000	500	10,500	11,000	500	10,500	12,000	1,500
Total	**24,100**	**25,660**	**1,560**	**1,010**	**24,100**	**24,650**	**550**	**24,100**	**26,670**	**2,570**
LIABILITIES										
Savings deposits	11,400	11,750	–350	–350	11,400	11,400	0	11,400	12,100	–700
Demand deposits	4,800	5,120	–320	–230	4,800	4,890	–90	4,800	5,350	–550
Other deposits	5,700	5,770	–70	–50	5,700	5,720	–20	5,700	5,820	–120
Derivatives ALM	0	220	–220	–200	0	20	–20	0	420	–420
Equity	**2,200**	**2,800**	**–600**	**–180**	**2,200**	**2,620**	**–420**	**2,200**	**2,980**	**–780**
Net income (P&L)	***0***	***0***			***0***	***0***	***0***	***0***	***0***	***0***
Other equity components	***2,200***	***2,800***	***–600***	***–180***	***2,200***	***2,620***	***–420***	***2,200***	***2,980***	***–780***
Total	**24,100**	**25,660**	**–1,560**	**–1,010**	**24,100**	**24,650**	**–550**	**24,100**	**26,670**	**–2,570**
Off-balance-sheet : derivatives ALM (notional amount)	16,000				16,000			16,000		

Source : BFIC.
(1) Market value minus book value for the assets, book value minus market value for the liabilities.
(2) This is a simplification because, in general, the sensitivity to an interest rate decrease is different than the sensitivity to an interest rate increase.

off-balance-sheet. Changes in the market values of these derivatives do not influence reported net income or equity. Nevertheless, these changes influence the economic value of the credit institution.

We can conclude from Table 1 that the credit institution has a net market value of 2,800, corresponding to the book value of equity (2,200) plus net latent surplus values on assets, liabilities and derivatives (600), which are recorded at amortised cost. The market value of equity is generally referred to as the economic value (or economic equity) of the credit institution.

The sensitivity of economic equity to a 1 p.c. change in interest rates is 180, i.e. a change equivalent to 6.42 p.c. Increases or decreases in interest rates have no impact at all on the accounting value of balance sheet items, accounting equity or the reported net income, since the assets and liabilities are recorded at amortised cost.[7] In contrast, the latent surplus value of 600 presented by the economic equity increases or decreases by 180 following a decrease or, respectively, an increase in interest rates.

3.3 Financial reporting in the new IAS 39 accounting environment

Tables 2 to 4 show the situation of the credit institution on the basis of the same figures as in table 1, but with application of IAS 39. First, we assume that the credit institution does not try to limit the volatility of its reported net income (Table 2) ; next, we compare the use of various techniques intended to manage the reported volatility of net income, namely the sale and purchase of investment securities, macro hedging (Table 3), and the use of the fair value option (Table 4).

(7) However, there will be an impact on the net interest income when the rates on the assets and liabilities are adjusted.

TABLE 2 FINANCIAL REPORTING UNDER IAS 39 WITHOUT MANAGING THE VOLATILITY OF NET INCOME AND EQUITY

	Balance sheet at time t				Balance sheet when interest rates increase by 1 p.c.			Balance sheet when interest rates decrease by 1 p.c.		
	Book value	Market value	Difference (1)	Interest rate sensitivity	Book value	Market value	Difference (1)	Book value	Market value	Difference (1)
ASSETS										
Loan portfolio	13,600	14,160	560	510	13,600	13,650	50	13,600	14,670	1,070
Securities portfolio classified as Available for sale (AFS)	**11,500**	**11,500**	**0**	**500**	**11,000**	**11,000**	**0**	**12,000**	**12,000**	**0**
Total	**25,100**	**25,660**	**560**	**1,010**	**24,600**	**24,650**	**50**	**25,600**	**26,670**	**1,070**
LIABILITIES										
Savings deposits	11,400	11,750	–350	–350	11,400	11,400	0	11,400	12,100	–700
Sight deposits	4,800	5,120	–320	–230	4,800	4,890	–90	4,800	5,350	–550
Other deposits	5,700	5,770	–70	–50	5,700	5,720	–20	5,700	5,820	–120
Derivatives ALM	**220**	**220**	**0**	**–200**	**20**	**20**	**0**	**420**	**420**	**0**
Equity	**2,980**	**2,800**	**180**	**–180**	**2,680**	**2,620**	**60**	**3,280**	**2,980**	**300**
Net income (P&L)	***0***	***0***	***0***	***200***	***200***	***200***	***0***	***–200***	***–200***	***0***
Other equity components	***1,980***	***1,800***	***180***	***120***	***1,980***	***1,920***	***60***	***1,980***	***1,680***	***300***
Reserve AFS	***1,000***	***1,000***	***0***	***–500***	***500***	***500***	***0***	***1,500***	***1,500***	***0***
Total	**25,100**	**25,660**	**–560**	**–1,010**	**24,600**	**24,650**	**–50**	**25,600**	**26,670**	**–1,070**

Source : BFIC.
(1) Market value minus book value for the assets, book value minus market value for the liabilities.

3.3.1 Outcome without managing the volatility of reported net income and equity

If the credit institution does not use any technique to manage reported net income, the main effects of the introduction of IAS standards will be as follows :

- the credit institution will reclassify its investment portfolio of interest-bearing securities as "Available for Sale". (8) This portfolio will be recorded at fair value, with changes in fair value being entered under the "AFS reserve" item on the liabilities side, forming part of equity. The creation of a separate "AFS reserve" item on the liabilities side is intended to make the example simpler ;
- under IAS rules, ALM derivatives will be classified as trading transactions in so far as they do not meet the conditions to qualify as "effective hedge instruments". They will be recorded on the balance sheet at their market value (220 in the example) and changes in that value will be reflected in the profit and loss account, and thus in equity. In Table 2, this difference has been deducted from equity under the "other equity components", which decreases to 1,980 (2,200 – 220).

These two changes together cause the reported equity to increase to 2,980 under the IAS rules, whereas the figure would have been only 2,200 under the Belgian rules (cf. Table 1). Conversely, the economic equity (equity expressed at market value) remains unchanged at 2,800 and still has a sensitivity of 180, whatever the applied accounting standards.

A 1 p.c. increase or decrease in interest rates causes a change of 300 in reported equity, namely a change of 500 in the AFS reserve offset by an opposing change of 200 in net income, due to the revaluation of the ALM derivatives. Application of IAS 39 therefore causes volatility in the reported net income and equity which did not occur under Belgian accounting standards (cf. Table 1).

When credit institutions do not have the necessary tools to manage the accounting volatility of their net income, they might in fact be tempted to modify their ALM position merely in order to stabilise reported net income or

(8) However, the credit institution could retain part of its portfolio as "held to maturity" and continue to record it at amortised cost. We assume that it does not do so for the purpose of this example.

to manage their ALM position without the use of derivatives. (9)

If credit institutions wish to avoid the volatility in reported net income without modifying their interest rate risk, they can use three methods, in particular the purchase and sale of investment securities, macro hedging, and the fair value option.

3.3.2 Outcome with the purchase and sale of investment securities

In the event of a 1 p.c. decrease in the interest rate, the credit institution can sell securities exhibiting a surplus value of 200 (recorded under "AFS reserve"). This will lead to a transfer of 200 from the AFS reserve to net income under realised capital gains, which will offset the negative net income of 200 due to revaluation of the ALM derivatives. This transaction will have no impact on the reported and market value of equity, since it merely involves a shift from the AFS reserve to net income. (10) If the credit institution does not wish to modify its ALM position, all it needs to do is to buy back securities having the same interest rate sensitivity as the securities sold.

Credit institutions already engage in transactions of this type, buying and selling securities to manage their ALM position and their net income. This is therefore a routine practice which will probably be accentuated by the introduction of IAS 39. However, such transactions cannot be effected unless the institutions have highly liquid securities exhibiting the necessary capital gains or losses. This should encourage the institutions to retain a portfolio of securities which can be readily realised. Moreover, sales and purchases of securities, only undertaken to compensate the effect of the revaluation of ALM derivates, are not justified economically and may have a negative input on banks' future margin income.

3.3.3 Outcome with macro hedging

Under IAS 39, the credit institution can identify derivatives used specifically to hedge the effects of interest rate changes on the fair value of individual assets or liabilities, or a group of assets or liabilities with similar risk characteristics. The change in the fair value of the items hedged resulting from a change in interest rates is then recorded in net income symmetrically with the change of fair value of the derivatives designated as "effective hedges".

Table 3 gives the example of the same institution concluding transactions in derivatives to hedge part of the interest rate risk on its AFS investment portfolio at a sensitivity of 200. To maintain a constant rate of sensitivity for its economic equity, this institution can do simultaneous transactions in derivatives in the opposite direction ("derivatives position taking" in table 3) with the same sensitivity of 200.

If interest rates change, the change in the value of the derivatives as a whole (i.e. –200 +200 –200 = –200) will be offset in the reported net income by an identical change – but in the opposite direction – in the value of the hedged security portfolio, namely 200. There will therefore be no net change in the reported net income.

In practice, in the IAS environment, this method is more difficult to apply than the technique of buying and selling securities. The rules on hedge accounting, particularly the obligations to document the transactions, to prove the effectiveness of the hedge and to maintain it at all times, are in fact very strict. In view of the operating constraints imposed by the IAS, it will probably be very difficult for credit institutions to use fair value hedge accounting to manage the volatility of reported net income.

3.3.4 Outcome with the use of the fair value option

The "fair value option" enables the credit institution to record any interest-bearing asset or liability at fair value, with changes in that fair value reflected in net income. Thus, a credit institution could choose to record certain assets and liabilities at fair value to offset the result relating to the revaluation at fair value of the derivatives used for ALM purposes.

To illustrate this possibility, table 4 presents a situation where part of the loans, part of the securities portfolio and part of the deposits are recorded at fair value with change of fair value in net income. The impact of this reclassification, i.e. the recording of asset and liability items at fair value instead of "at amortised cost", is +10, or +70 for loans and –60 for deposits. This impact is reflected in equity, which amounts to 2,990 instead

(9) For example, in the table 2 scenario, the credit institution could have refrained from hedging its interest rate risk by effecting transactions in derivatives. That would have eliminated the volatility in the accounting result of 200, but would also have increased the volatility of the economic equity by 200 (i.e. the economic equity would have a volatility of +380 in the case of a 1 p.c. decrease in interest rates). To limit the volatility of economic equity, so the interest rate risk, the bank will probably try to change its balance sheet structure in order to reduce the duration of its assets, for example in limiting the granting of long term credit with fixed interest rate.

(10) In the event of a 1 p.c. increase in interest rates, the institution would have to sell securities showing a loss.

TABLE 3 FINANCIAL REPORTING UNDER IAS 39 WITH THE USE OF THE FAIR VALUE HEDGE

	Balance sheet at time t				Balance sheet when interest rates increase by 1 p.c.			Balance sheet when interest rates decrease by 1 p.c.		
	Book value	Market value	Difference (1)	Interest rate sensitivity	Book value	Market value	Difference (1)	Book value	Market value	Difference (1)
ASSETS										
Loan portfolio	13,600	14,160	560	510	13,600	13,650	50	13,600	14,670	1,070
Securities portfolio classified as Available for sale (AFS)	8,000	8,000	0	300	7,700	7,700	0	8,300	8,300	0
Securities portfolio covered by a fair value hedge	**3,500**	**3,500**	**0**	**200**	**3,300**	**3,300**	**0**	**3,700**	**3,700**	**0**
Derivatives position taking	**0**	**0**	**0**	**200**	**–200**	**–200**	**0**	**200**	**200**	**0**
Total	**25,100**	**25,660**	**560**	**1,210**	**24,400**	**24,450**	**50**	**25,800**	**26,870**	**1,070**
LIABILITIES										
Savings deposits	11,400	11,750	–350	–350	11,400	11,400	0	11,400	12,100	–700
Sight deposits	4,800	5,120	–320	–230	4,800	4,890	–90	4,800	5,350	–550
Other deposits	5,700	5,770	–70	–50	5,700	5,720	–20	5,700	5,820	–120
Derivatives ALM	220	220	0	–200	20	20	0	420	420	0
Derivatives that qualify as fair value hedge	**0**	**0**	**0**	**–200**	**–200**	**–200**	**0**	**200**	**200**	**0**
Equity	**2,980**	**2,800**	**180**	**–180**	**2,680**	**2,620**	**60**	**3,280**	**2,980**	**300**
Net income (P&L)	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***
Other equity components	***1,980***	***1,800***	***180***	***120***	***1,980***	***1,920***	***60***	***1,980***	***1,680***	***300***
Reserve AFS	***1,000***	***1,000***	***0***	***–300***	***700***	***700***	***0***	***1,300***	***1,300***	***0***
Total	**25,100**	**25,660**	**–560**	**–1,210**	**24,400**	**24,450**	**–50**	**25,800**	**26,870**	**–1,070**

Source : BFIC.
(1) Market value minus book value for the assets, book value minus market value for the liabilities.

of 2,980[11]. In the case of a 1 p.c. decrease in interest rates, the sensitivity of the fair value, and hence of the reported net income relating to these reclassified assets and liabilities, is + 180 (+70 +150 –40), which offsets most of the sensitivity of the ALM derivatives of –200. A 1 p.c. decrease in interest rates will therefore have a negative impact of only 20 (180 –200) on the reported net income. Since the sensitivity of the economic equity is still 180, the credit institution will thus be able to continue managing its ALM position as before without suffering excessive volatility in its reported net income.[12]

Although the fair value option can help credit institutions to manage the volatility of their net income, it is still rather inflexible because the credit institution has to classify the asset or liability under the fair value option "at inception", and there is no possibility of reclassification. Use of the fair value option also raises numerous questions regarding the reliability of the calculation of fair value for non-liquid items such as loans and deposits, leading to the risk of manipulation of the figures. Another drawback of this option is that the comparison of net income between credit institutions is difficult, since each institution is free to choose whether to record assets and liabilities at fair value with variations of fair value reflected in net income. This works against comparability of annual accounts which is one of the main goals of the accounting regulations. For a more extensive discussion and an analysis of the implications of an unrestricted fair value option, see ECB (2004b).

(11) The capital gain of 300 on investment securities currently classed under the fair value option was transferred from the AFS reserve to the "other equity items".

(12) However, the sensitivity of the accounting equity to a 1 p.c. change in interest rates is now 330 compared with 300 before the use of the fair value option. We can demonstrate that, in specific circumstances, the fair value option can reduce the volatility of both net income and equity.

TABLE 4 FINANCIAL REPORTING UNDER IAS 39 WITH THE USE OF THE FAIR VALUE OPTION

	Balance sheet at time t				Balance sheet when interest rates increase by 1 p.c.			Balance sheet when interest rates decrease by 1 p.c.		
	Book value	Market value	Difference (1)	Interest rate sensitivity	Book value	Market value	Difference (1)	Book value	Market value	Difference (1)
ASSETS										
Loan portfolio (at amortized cost)	11,130	11,620	490	440	11,130	11,180	50	11,130	12,060	930
Loan portfolio (fair value option)	**2,540**	**2,540**	**0**	**70**	**2,470**	**2,470**	**0**	**2,610**	**2,610**	**0**
Securities portfolio classified as Available for sale (AFS)	8,500	8,500	0	350	8,150	8,150	0	8,850	8,850	0
Securities portfolio classified as "fair value option"	**3,000**	**3,000**	**0**	**150**	**2,850**	**2,850**	**0**	**3,150**	**3,150**	**0**
Total	**25,170**	**25,660**	**490**	**1,010**	**24,600**	**24,650**	**50**	**25,740**	**26,670**	**930**
LIABILITIES										
Savings deposits	11,400	11,750	–350	–350	11,400	11,400	0	11,400	12,100	–700
Sight deposits	4,800	5,120	–320	–230	4,800	4,890	–90	4,800	5,350	–550
Other deposits	3,440	3,450	–10	–10	3,440	3,440	0	3,440	3,460	–20
Other deposits "fair value option"	**2,320**	**2,320**	**0**	**–40**	**2,280**	**2,280**	**0**	**2,360**	**2,360**	**0**
Derivatives ALM	220	220	0	–200	20	20	0	420	420	0
Equity	**2,990**	**2,800**	**190**	**–180**	**2,660**	**2,620**	**40**	**3,320**	**2,980**	**340**
Net income (P&L)	***0***	***0***	***0***	***20***	***20***	***20***	***0***	***–20***	***–20***	***0***
Other equity components	***2,290***	***2,100***	***190***	***150***	***2,290***	***2,250***	***40***	***2,290***	***1,950***	***340***
Reserve AFS	***700***	***700***	***0***	***–350***	***350***	***350***	***0***	***1,050***	***1,050***	***0***
Total	**25,170**	**25,660**	**–490**	**–1,010**	**24,600**	**24,650**	**–50**	**25,740**	**26,670**	**–930**

Source : BFIC.
(1) Market value minus book value for the assets, book value minus market value for the liabilities.

The International Accounting Standards Board (IASB) therefore intends to restrict the scope for using the fair value option, and has published an exposure draft on this matter. (13) The restrictions which the IASB intends to impose on the use of the fair value option have yet to be examined by market practitioners. (14) On the basis of a first analysis of this exposure draft, the new proposed rules relating to the use of the fair value option will permit banks to register loans and deposits at fair value, as we have assumed in the example, if the revaluation of these items "substantially" offsets the impact on net income of the revaluation of ALM derivatives. (15) Although the principle underlying this provision is not disputed, practitioners are wondering about the way in which the IASB intends to interpret the term "substantially". If banks must apply the same operating criteria as in the case of hedge accounting, particularly as regards documentation and effectiveness, the fair value option will probably not be used in practice.

(13) See exposure draft of 21 April 2004 : Amendments to IAS 39 Financial Instruments : Recognition and Measurement.

(14) The proposal is that an entity can designate a financial asset or a liability at fair value through profit and loss only when this asset or liability meets one of the following conditions : i) The item is a financial asset or financial liability that contains one or more embedded derivatives, (ii) The item is a financial liability whose cash flows are contractually linked to the performance of assets that are measured at fair value, (iii) The exposure to changes in the fair value of the financial asset or financial liability (or portfolio of financial assets or financial liabilities) is substantially offset by the exposure to the changes in the fair value of another financial asset or financial liability (or portfolio of financial assets or financial liabilities), including a derivative (or portfolio of derivatives); (iv) The item is a financial asset other than one that meets the definition of loans and receivables ; (v) The item is one that this or another Standard allows or requires to be designated as at fair value through profit or loss.

(15) This is the conclusion of a first analysis of the exposure draft. The reader must take into account that this exposure draft is not a final document and that the regulators, who will supervise the application of the fair value option, have not yet taken a position regarding this new exposure draft.

Another limitation proposed in the exposure draft is that the fair value of the financial instruments must not only be reliable but also verifiable, which means that the variability in the range of reasonable fair value estimates will be low. This can also limit the possibility of using the fair value option for loans and deposits if there are no market transactions on these instruments to verify the fair value or confirm the results of models used to estimate the fair value.

4. Illustration of the impact of IAS 39 on the calculation of minimum capital requirements

According to the current rules, the amount of regulatory capital is determined essentially according to the accounting value of equity, and capital requirements are calculated on the basis of the accounting value of the assets. Under the Belgian accounting rules, the accounting value of equity and assets is not very sensitive to interest rate changes. This will no longer be the case once IAS 39 is applied, since the accounting value of equity, and hence of regulatory capital, will change with movements in interest rates and with the volume of interest-bearing assets and liabilities recorded at fair value.

TABLE 5 CALCULATION OF THE CAPITAL RATIOS IN THE VARIOUS SCENARIOS

	Initial situation	After a 1 p.c. increase in interest rates	After a 1 p.c. decrease in interest rates
Under current accounting rules (cf. Table 1)			
Regulatory capital	2,200	2,200	2,200
Capital requirements	1,928	1,928	1,928
Capital ratio (in percentages)	9.1	9.1	9.1
Under IAS rules without use of the fair value option (cf. Tables 2 and 3)			
Regulatory capital	2,980	2,680	3,280
Capital requirements	2,008	1,968	2,048
Capital ratio (in percentages)	11.9	10.9	12.8
Under IAS rules with use of the fair value option (cf. Table 4)			
Regulatory capital	2,990	2,660	3,320
Capital requirements	2,013	1,968	2,059
Capital ratio (in percentages)	11.9	10.8	12.9

If the banking regulators decide, for the purpose of calculating regulatory capital, to take into account the impact of IAS 39, i.e. the unrealised gains and losses on the asset and liability items stated at fair value, the capital ratios will probably become more volatile. Table 5 simulates the change in the capital ratios in the various scenarios considered earlier (Tables 1 to 4), on the assumption that the capital requirement equals 8 p.c. of the accounting value of the assets. Regulatory capital is assumed to be equal to the amount of equity in columns 1, 5 and 8.[16] To obtain the capital requirements, we took the total assets figures stated in the same columns and multiplied them by 8 p.c. Finally, the capital ratio can be calculated directly from Table 5, by multiply the ratio between the regulatory capital and the capital requirement by 8 p.c.

European banking supervisors have not yet decided how to calculate the minimum capital requirements in the IAS referential. Without being exhaustive, we can summarise as follows the arguments in favour of taking into account the impact of IAS 39 for the purposes of the capital regulations:

- If the impact of IAS 39 is not taken into account by supervisors, regulatory capital could be very different from the IAS accounting value of equity. In an extreme situation, a bank could have negative accounting equity while still having an adequate level of regulatory capital. It is difficult to predict how the credit institution's counterparties and the market in general would react to such a situation.
- IAS 39 leads to greater transparency in the capital gains or losses on investment securities to be classified as AFS. At present, these gains or losses remain latent.[17] This allows credit institutions, wishing to increase their regulatory capital or their profits, to realise capital gains while retaining a portfolio of securities with only latent losses; yet this behaviour is not penalised by regulations. Moreover, if IAS 39 leads to the inclusion of part of unrealised capital gains or losses in regulatory capital, this could encourage credit institutions to monitor more closely those gains or losses.
- In the conduct of their business, credit institutions pay attention to the impact of their operations on reported net income. It is therefore in the regulators' interest to adopt regulations which are based on accounting data.
- Accounting figures are audited, which ensures more reliable data and hence a sounder foundation for calculating compliance with statutory requirements.

(16) This is an assumption made for simplicity, because in practice the regulator will probably not take the whole of the unrealised capital gains into account for the purpose of calculating the regulatory capital, but will apply a haircut to take account of the volatility risk or, if appropriate, deferred tax liabilities.

(17) See the article "*Interest Rate Risk in the Belgian Banking Sector*" in this Financial Stability Review for an assessment of the magnitude of these latent gains and losses in the securities portfolio of Belgian credit institutions.

However, to determine the arrangements for integrating IAS 39 into the method of calculation of capital ratios, the supervisor will have to take into account certain risks or constraints:

- The volatility of the solvency ratio could have an impact on lending in general. A reduction in this ratio will in fact restrict the bank's scope for lending, whereas the reduction might be due merely to a temporary change in interest rates.
- The inclusion of all accounting losses and gains associated with the change in the fair value of interest-bearing assets and liabilities on the banking book could encourage credit institutions to take interest rate risk positions which are not economically justified, merely in order to maintain the level of their capital ratio. Thus, in the scenario of Table 2, the credit institution could archieve a reduction of 300 in the sensitivity of the accounting equity to a change in interest rates by concluding new transactions in derivatives or changing the interest rate sensitivity of its securities portfolio. The sensitivity of accounting equity to interest rate changes would then become zero, but the sensitivity of economic equity would move in the opposite direction, from +180 to –120 for a 1 p.c. decrease in interest rates.
- If the bank wants to keep its ALM position unchanged, it could violate the capital regulation and, consequently, be required to raise equities or subordinated debts to compensate for losses related to changes in the fair value of interest bearing derivatives and assets in the banking book. This increase in banks' cost of capital will only be motivated by the regulatory treatment of revaluation losses of a temporary nature.

5. Conclusions

This article endeavours to show by means of examples that, under the new IAS accounting rules, a credit institution can manage the volatility of its net income without modifying its ALM position. However, asset and liability management will be much more difficult than in the current situation (Belgian accounting standards). Moreover, owing to certain restriction on applying the IAS rules, credit institutions will not be able, in practice, to avoid all volatility in their reported net income, but will have to content themselves with trying to limit the volatility.

The "fair value option" offers a practical way of managing the volatility of net income, in addition to buying and selling investment securities classified as AFS assets. This option is useful for the banking sector because it offers a practical alternative to the fair value hedge and macro hedge accounting options which can not be applied by banks because of their inability to meet the strict criteria imposed by the IAS 39. Although there is justification for limiting the use of this option, as the IASB and ECB propose, particularly to prevent abuse and to preserve a degree of comparability in the annual accounts, it would be essential to ensure that the limitations imposed are not so restrictive as to make it impossible to use this method, given that fair value hedge accounting is not likely to be used by banks.

When credit institutions do not have the necessary tools to manage the accounting volatility of their net income, they may in fact be tempted to modify their ALM position merely in order to stabilise reported net income or to manage their ALM position without the use of derivatives. In this case, banks would have to manage their ALM position by using traditional assets as bonds or credits, for example, through a limitation of their long term credits with fixed rates or their investment in long term securities in order to reduce the duration of their assets. This would certainly have an impact on their profitability but also on the economy as a whole.

The article also points out that, in the IAS environment, accounting equity will be more volatile, and credit institutions will probably want to limit that volatility. Their behaviour will depend both on the reaction of their counterparties and of the market in general to this volatility, and on the treatment of IAS 39 in the context of capital regulations. Care must therefore be taken to define rules on capital requirements which do not increase the cost of capital of the banking sector or encourage credit institutions to take ALM positions solely in order to manage the accounting value of their equity and their capital ratios.

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Lay out: NBB Prepress
Cover: NBB Multimedia

Published in June 2004